NEW ZEALAND JOURNAL OF Agriculture

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L. C. MITCHELL

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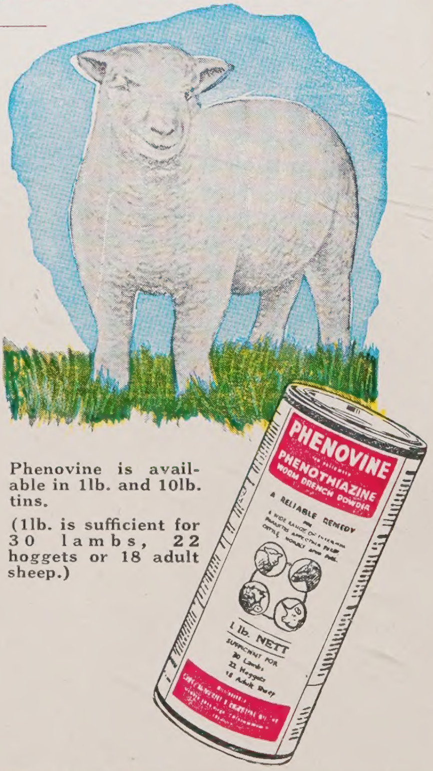

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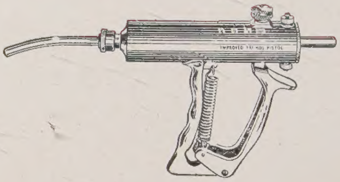

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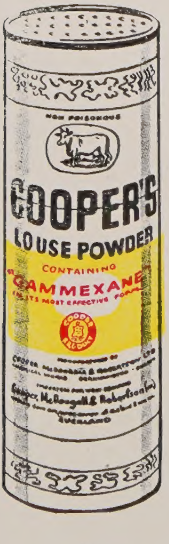

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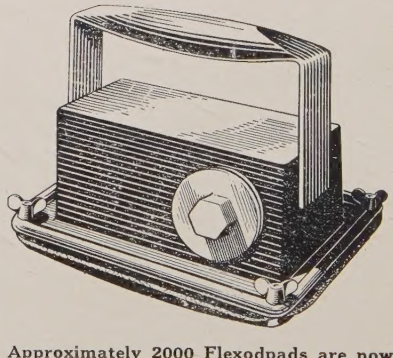

Approximately 2000 Flexodpads are now in use in the Dominion and users are proving our claim that the Flexopad does away with mess and wastage and cuts time and labour costs in branding. Enquire for full particulars from your Stock and Station Agent or direct to us. A fully descriptive leaflet is available.

All the products featured on this page are obtainable from Stock and Station Agents and Merchants, or write to:
COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD., Box 559, Auckland.

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Hon. E. L. Cullen,
Minister of Agriculture.

This month's cover

Fruit growing in New Zealand has developed into an important industry and is well distributed throughout the country. About 10,000 acres are devoted to apples, the principal crop, and the Dominion is not only self-sufficient in this healthful fruit, but in good seasons has substantial quantities available for export. Last year nearly 1,000,000 bushel cases valued at more than £860,000 were shipped to Britain, providing a helpful addition to the restricted food supplies there. This month's cover of apple picking in the Hawke's Bay district, which produces the second largest quantity of apples in New Zealand and which has the heaviest yield per acre, was painted by L. C. Mitchell and is based on a photograph taken by National Publicity Studios.

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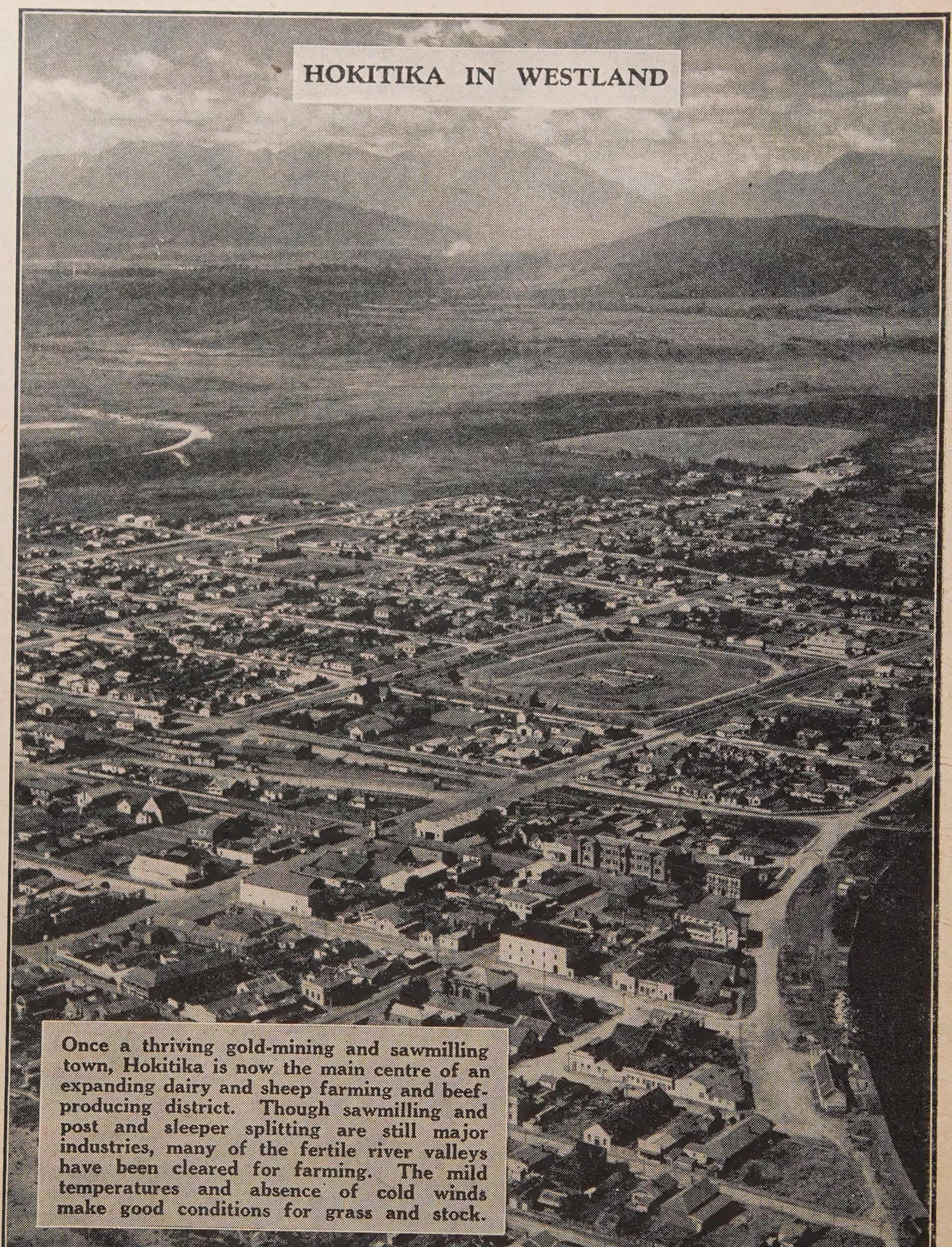
SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available at 3d. a copy, post free.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

HOKITIKA IN WESTLAND



Once a thriving gold-mining and sawmilling town, Hokitika is now the main centre of an expanding dairy and sheep farming and beef-producing district. Though sawmilling and post and sleeper splitting are still major industries, many of the fertile river valleys have been cleared for farming. The mild temperatures and absence of cold winds make good conditions for grass and stock.

[*V. C. Browne photo.*

Objectives of Land-settlement Policy

"I ALWAYS contemplate the Earth with reverence. I like the phrase 'Mother Earth'—the source of all our sustenance; the storehouse of all our supplies, our raiment, our shelter; the pathway of our feet; the final resting place of our worn-out bodies. . . . I cannot but regard its depletion as vandalism and sacrilege. The good God gave us but one soil, and He gave it for the use of all His children to the end of time. We are but His trustees in the occupancy and preservation of the estate of all posterity. If we despoil it, if we fail to maintain it, if we leave it less fruitful than we receive it, then we are unfaithful trustees."

That quotation—though I have been unable to find the author—is to my mind a complete statement of what I feel should be our attitude toward the land. New Zealand owes its prosperity in the first place to the land, and we must always look to the land as the foundation of our economic structure. As Minister of Lands and Rehabilitation and the instrument of the Government I have been privileged to implement the most practical and soundly-organised land-settlement scheme in the country's history—a scheme that, as well as serving the primary purpose of placing ex-servicemen on the land, is also a blueprint of a wider, more permanent organisation for the development of land and the settlement of young farmers when rehabilitation is completed.

After Rehabilitation

The Young Farmers' Clubs of New Zealand submitted a post-rehabilitation settlement scheme which, after discussion, has been agreed to by the Government. As in the rehabilitation scheme, there will be a farm training and grading system to ensure that only those competent in farm management under current conditions will be placed on the land. Economic standards for farm properties will be set up in the same way as for ex-servicemen settlers, so that no man will be put on a property that cannot, with reasonable efficiency, return his family a decent living, maintain the farm without deterioration, and meet all mortgage charges without hardship. One hundred per cent. finance will be made available under conditions very similar to those of the present rehabilitation scheme, at ruling rates of interest.

Any competent and industrious farmer must be assured of a reasonable income and secure future and, above all, the land—our most precious possession—must be nurtured and conserved in trust for "all posterity." Economic circumstances must not be allowed to force any farmer to "mine" his land to obtain a decent living for his family.

I believe there are four important conditions for the foundation of a stable farming economy, and the Government is doing its utmost to realise those conditions.

First, there must be security of tenure, whether on a freehold or leasehold title, and that has been provided for in the consolidated Land Act passed last year.

Second, land valuations must be sound and based on productive value; that was originally laid down in the Servicemen's Settlement and Land Sales Act in 1943.

Third, the farmer must be able to depend on stable prices, both for his own produce and for the implements and material he requires on his farm; that is one of the aims of the guaranteed price structure, orderly marketing, and the over-all price-control legislation. The farmer's income must be sufficient to give his family a reasonable living, meet farm-maintenance costs, and discharge his mortgage and other commitments in safety. He must always be able to put something back into the land—"the source of all our sustenance."

Fourth, adequate finance must be available at reasonable rates of interest; the Government is making 100 per cent. loans available at the lowest rates in the history of the country.

These four conditions are the basis of the rehabilitation scheme, and will also be the foundation of the Government's long-term land-settlement policy. I would rather require servicemen to wait a year or two than rush them on to ill-prepared and unproductive land, or settle them under conditions which will not make success reasonably sure.

A Continuing Task

With persisting difficulties in the supply of fencing and other essential materials—needed by private farmers as much as by the State—the development and subdivision of Crown blocks is still not as fast as it should be, and many areas which can be classed as long-term development projects will not in the end be settled by ex-servicemen at all. Eventually the land will be needed and used for the long-range scheme, however, and I want to stress that all the suitable land available will continue to be prepared for settlement by the Land Development Branch of the Lands and Survey Department.

As "trustees in the occupancy and preservation of the estate of all posterity" we shall show our humble appreciation of God's gift by bringing into production, as quickly as circumstances allow, every acre of land that is worth development. But we shall not make a fetish of the economic yardstick. The overriding considerations are the national interest and the pressing needs of the hungry people of the world.

We shall try not only to maintain our land, but to leave it at least as fruitful as we receive it; we shall endeavour to be faithful trustees.

C. F. SKINNER,
Minister of Lands and Rehabilitation.

Show Dates

THE following are dates and venues of A. and P. Shows in March.

March 1—Otorohanga A. and P. at Otorohanga.
March 5—Albany A. and P. at Albany.
March 5—Matamata A. and P. at Matamata.
March 5—Waiotira Junction Show Association at Waiotira.
March 5—Mangonui County A. and P. at Kaitaia.
March 5—Temuka and Geraldine A. and P. at Winchester.
March 5—Maniototo A. and P. at Ranfurly.
March 9—Morrinsville A. and P. at Morrinsville.
March 11 and 12—Whangarei A. and P. at Whangarei.
March 11 and 12—Waikato Central Agricultural Association at Cambridge.
March 12—Kumeu District A. and H. at Kumeu.
March 12—Hawke's Bay A. and P. at Hastings.
March 12—Cheviot A. and P. at Cheviot.
March 12—Mt. Benger A. and P. at Roxburgh.
March 15—Lake County A. and P. at Arrowtown.
March 19—Poverty Bay A. and P. at Gisborne.
March 19—Mayfield A. and P. at Mayfield.
March 19—Upper Clutha A. and P. at Wanaka.
March 19—Wellsford A. and P. at Wellsford.
March 26—Methven A. and P. at Methven.
March 26—Hawarden A. and P. at Hawarden.

REGISTRATION OF

DAIRY FACTORY MANAGERS

Intending applicants are hereby notified that applications for registration under the Dairy Factory Managers' Regulations should reach the Registrar, Dairy Factory Managers' Registration Board, c/o Department of Agriculture, P.O. Box 3004, Wellington, on or before April 1, 1949. Forms are available from the Registrar.

Attention is drawn to the fact that any application which is received by the Board after April 1, 1949, shall not, except in special circumstances, be considered by the Board until after April 1, 1950.

E. M. EDGECOMBE, *Registrar.*

N.B.—this notice refers to persons who are NOT AT PRESENT HOLDERS OF CERTIFICATES. Notice of renewal and renewal form will be posted to every registered manager by the Registrar.

METEOROLOGICAL RECORDS FOR DECEMBER

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Auckland	160	63.4	— 0.4	81.0	48.0	2.30	10	— 0.83	0.65	31	173.5
Tauranga	10	63.2	+ 1.2	80.1	39.2	1.50	9	— 2.15	1.12	31	277.3
Ruakura	131	60.2	— 1.2	86.1	36.2	2.31	14	— 0.87	0.90	31	220.0
Rotorua	980	61.5	+ 1.5	88.0	35.5	2.59	10	— 1.20	1.40	31	235.3
Gisborne	12	63.0	— 0.2	85.6	38.5	1.07	5	— 0.86	0.86	31	326.9
New Plymouth ..	160	59.4	— 0.7	72.2	39.1	4.24	14	— 0.19	1.41	19	182.9
Napier	6	64.0	+ 0.9	83.3	44.2	0.63	4	— 1.42	0.49	31	313.5
Taihape	2157	58.4	+ 2.1	82.0	33.0	1.18	7	— 2.09	0.76	1	
Wanganui	72	61.6	+ 0.5	77.2	42.4	0.38	9	— 2.38	0.11	31	236.5
Palmerston North	110	60.8	+ 0.4	84.3	38.0	1.72	14	— 1.44	0.27	13	214.0
Waingawa	350	61.7	+ 1.7	91.9	33.5	0.84	6	— 1.80	0.40	1	271.3
Wellington	415	60.2	+ 1.2	84.3	38.1	1.41	8	— 1.88	0.57	1	247.6
Nelson	24	60.5	— 0.3	78.7	40.7	0.66	7	— 2.35	0.40	19	264.8
Blenheim	12	61.2	— 1.0	92.1	36.9	0.11	4	— 1.59	0.08	1	307.6
Hokitika	12	54.9	— 1.1	68.8	34.9	7.53	15	— 2.71	1.84	6	196.3
Hanmer Springs ..	1225	58.6	+ 0.8	91.6	31.0	1.71	5	— 2.17	0.80	31	248.6
Christchurch ..	22	60.4	+ 0.6	80.3	38.9	0.50	5	— 1.99	0.31	31	217.7
Ashburton	323	60.7	+ 2.1	87.0	36.0	0.31	6	— 2.66	0.10	31	228.9
Timaru	56	60.4	+ 1.8	80.0	25.4	0.63	5	— 1.99	0.28	1	226.5
Alexandra	520	61.4	+ 1.0	92.2	36.5	0.53	6	— 0.85	0.20	12	232.1
Taieri	80	56.4	+ 0.4	78.6	36.0	2.49	19	— 0.25	0.47	1	
Invercargill ..	32	55.4	+ 0.3	74.0	35.0	4.66	19	+ 1.01	1.11	14	186.0

Fruit Crop Estimates for January, 1949

THE following estimates of the fruit crop for January, 1949, in 000's of bushel cases, are provisional and revised monthly for the period November to March and are summarised from information supplied by field officers of the Horticulture Division, Department of Agriculture.

FRUIT	DISTRICT									
	Auckland	Gisborne	Hawke's Bay	Manawatu Wanganui	Wairarapa	Nelson	Marlborough	Canterbury North Otago	Central Otago	Total
APPLES—										
Ballarat	40	8	60	1	1	7	5	8	2	132
Cox's Orange Pippin ..	6	3	60	1	1	92	9	12	11	195
Delicious	26	8	85	2	5	133	17	21	44	341
Dougherty	17	5	55	—	—	21	2	—	—	100
Granny Smith	53	2	100	2	—	56	1	2	2	218
Gravenstein	23	—	35	—	2	42	1	1	—	104
Jonathan	9	—	40	—	1	219	17	14	21	321
Sturmer	5	5	170	5	13	298	23	45	29	593
Other varieties	82	4	137	4	2	115	17	43	42	446
Total	261	35	742	15	25	983	92	146	151	2450
PEARS—										
Beurre Bosc	3	—	3	—	—	7	—	—	—	13
Louise Bonne de Jersey	—	—	12	—	—	—	—	—	—	12
Packham's Triumph ..	5	—	4	—	—	2	—	—	—	11
P. Barry	4	1	11	—	1	3	—	1	—	21
W. B. Chretien	17	—	40	—	—	25	—	2	6	90
Winter Cole	1	1	45	—	1	20	—	5	2	75
Winter Nelis	—	1	50	—	—	8	1	1	4	65
Other varieties	18	1	7	2	—	14	1	6	5	54
Total	48	4	172	2	2	79	2	15	17	341
OTHER FRUITS—										
Peaches	39	6	260	1	—	55	4	7	87	459
Apricots	1	—	2	—	—	—	—	8	118	129
Nectarines	1	1	25	—	—	1	1	2	18	49
Plums	45	6	43	1	—	8	1	6	23	133
Cherries	—	—	1	—	—	1	1	2	7	12
Quinces	10	1	9	—	—	9	—	—	1	30

Intensive Small Farming in the Port Hills

EARLY AND LATE PRODUCE FOR CHRISTCHURCH MARKET

By A. G. KENNELLY, Vegetable Instructor,
Department of Agriculture, Christchurch.

BUT for the favourable aspect of land on the nearby Port Hills, the city of Christchurch would have to rely to a much greater extent on fruit and vegetables from Nelson and the North Island. The Port Hills are an impressive range extending in a roughly-convex line for about 25 miles from Godley Head in the north-east along the northern side of Lyttelton Harbour to Motukarara in the south-west. They rise fairly steeply for the greater part of their length to heights varying from about 1300 to 1800ft. above the level expanse of the Canterbury Plains, on which most of the city of Christchurch stands, and because of spurs and valleys, mainly along the northern and north-western face, they afford a number of sunny, sheltered, and comparatively frost-free areas on which early, late, and half-hardy crops are grown. For intensive production on comparatively-small areas, this land is probably unique in New Zealand.

CHRISTCHURCH is little above sea level, and the value of the sheltered areas from three to ten miles from its centre lies in the fact that on the level plains which extend for many miles around the city early and late frosts either prohibit or make hazardous the growing of most early and half-hardy crops except under glass.

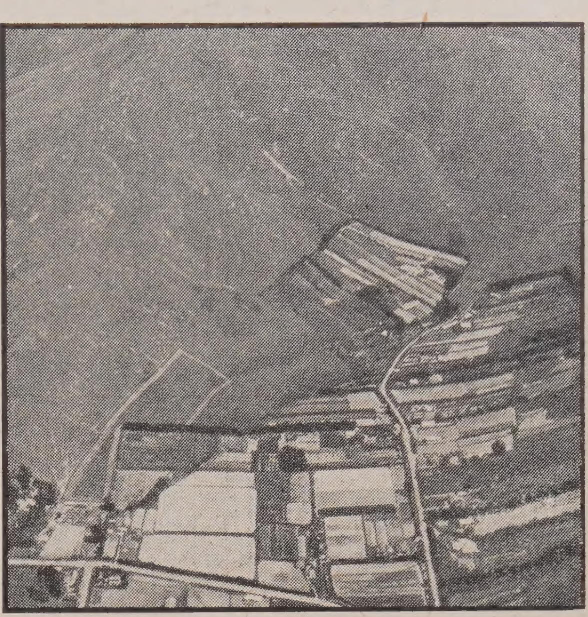
The first exploitation of each area for intensive small farming is mainly traceable to the time of its separation and subdivision from the inferior-quality hill country of which, for the purpose of sheep farming, it formed a part.

Development of the Principal Areas

The area used for intensive small farming is small in relation to the total area of the Port Hills. Principal production areas on the northern side from the north-eastern end along the hills to the south-west are, in the order given, Moncks Spur, Mount Pleasant, Heathcote, Horotane Valley, Avoca Valley, St. Martins Valley, Bowenvale, and, well to the south-west, Lansdowne Valley. On the southern side Governor's Bay and Allandale are not so favourably situated but produce earlier crops than the plains land.

Heathcote Valley and contiguous land on the slopes above Bridle Path Road were settled first because, from the time of the first immigrants in 1850 until the Heathcote tunnel was pierced in 1879, the route followed by settlers was over the hill at the head of the Heathcote Valley and along what was then known as the "bridle path" to Ferrymead, from where before the bridge was built it was customary to travel by boat up the Heathcote River to the settled plains. Largely because Heathcote was a staging halt on the route to the settlement of Christchurch, a number of houses and a settlement of sorts developed there early. It is still the only small-holding area on the hills which has a largely self-contained residential area; this consists mainly of the houses of workers at the malt factory (which is almost as long-established as the settlement) and of Lyttelton workers who choose to live on the sunnier side of the hill.

The first orchard at Heathcote, consisting of 6 acres of apricot trees, was established by Mr. Gimlett in 1875. Other areas were planted in succeeding years, and the first glasshouse, about 60ft. by 25ft., was erected some time before 1906 by Mr. Edmond Wilkinson, who then owned an area that is now one of the best orchards and market gardens in the district. Mr. Wilkinson was keenly interested in horticulture and at one time did considerable lecturing on the subject, notably at schools and at Canterbury College. The first range of commercial glasshouses was erected about 1909 by Mr. L. Shearman, who had had considerable experience of glasshouse work in the Channel Islands. Like practically all the glasshouses which were built in the immediately-subsequent years, Mr. Shearman's houses were used mainly for raising tomato plants for planting in the open.



[*V. O. Browne photo.*

Avoca Valley is one of the areas in the nearby Port Hills with the favourable aspect which allows them to make an important contribution to the supplies of early and late fruit, vegetables, and flowers for the Christchurch market.

Mr. J. F. Scott's Influence

Heathcote and the adjoining districts were not subdivided on a large scale until after 1912, and though from 1914 to 1920 a good many orchards were planted (some of them with little judgment) few glasshouses were built until after 1920. However, the extensive development of intensive small farming on most of the areas now worked can be traced directly to the time when a large part of the land of the Port Hills came into the possession of the late Mr. J. F. Scott, whose son still owns and raises sheep on extensive areas of it. Used for sheep farming from the time of the arrival of the first immigrants, the Port Hills land changed hands several times before 1910, when a large part of it, including most of the areas now used for intensive small farming, was acquired by Mr. Scott.

He seems to have been a remarkable man. He started business with very little capital and eventually owned extensive land holdings and diverse business interests which included, as well as the Port Hills area, a sheep station at Parnassus, a large orchard at Chaney's, and an apiary at Broadfield.

Always keenly interested in horticulture, he grew tomatoes from a very early date in four large glasshouses at his home in Opawa, and he is said to have claimed often that, despite the extent of his other business interests, his glasshouses were not only the foundation of his fortune but the firmest base on which it rested.

Acreages of Principal Crops Grown in the Port Hills

	Plums	Apricots	Cherries	Peaches	Small fruit	Spring cabbage	Lettuce	Celery	Tomatoes	Other vegetables and flowers	Other fruit	Number of tomato glasshouses	Number of growers holding ½ acre or more	Total acreages of crops
Moncks Spur and Mt. Pleasant	*	*		*	5	*	5		8	6	*		14	24
Heathcote ..	12½	12¾	2½	½	2	6	4		22	10	¼	23	17	72½
Horotane ..	20	22	3¼	2¼	1	10	6		31	8	*	32	19	103½
Avoca	7	1	1	2	1	4	11	1½	15	5	*	17	12	48½
St. Martins ..	*		½		7	6	8		10	5	*	21	15	36½
Bowenvale ..	3	*		*	6	15	15	2½	15	8	*	28	22	64½
Lansdowne ..	2½	½	¼	7½	8				8	3	½	2	8	30¼
Governor's Bay and Allandale	7	1½	4	10	4	2	3		12	44	½	3	13	88
Totals	52	37¾	11½	22¼	34	43	52	4	121	89	1¼	126	120	467¾

* Indicates that the subjects are grown but not in sufficient quantities to show acreages.

Because of seasonal variations, the acreages of vegetables, flowers, and tomatoes are the averages of a number of years. Considerable quantities of runner beans, peas, and cucumbers and some early potatoes, marrows, melons, and rhubarb are also grown and are all grouped under vegetables. The boundaries of some of the districts are not defined clearly, and the decision whether or not to include contiguous areas which from a production point of view clearly could be included must be arbitrary. Therefore the definition of a particular area has not followed natural boundaries in every case.

Probably because of his horticultural experience, Mr. Scott was quick to realise the possibilities of fruit growing and market gardening of the warm, sheltered valleys, and between 1912 and 1914 he cut up portions of Heathcote and the whole of Horotane. He built a road into Horotane and sold the land for from £140 to £160 an acre. The claim that he planted the macrocarpa hedges which are now an impressive feature of the holdings seems doubtful, but he did import a large number of fruit trees from Australia, and also bought fruit trees and other nursery stock in bulk from a local nursery and sold them cheaply to the buyers of land. He assisted with the fencing, which had to be wire-netted to a height of at least 18in. because of the depredations of rabbits and hares, and therefore was a first priority where fruit and vegetables were grown.

Not long after Horotane was cut up Mr. Scott had the nearby Avoca Valley surveyed and roaded. The area owned by him—the greater part of the valley—was cut up and sold for about £120 an acre in 1918. Relatively little fruit has been planted there, though there is one good-sized orchard and small plantings of plums and apricots are still occasionally made. For the first few years the principal crops, as in several of the other valleys, were tomatoes, peas, and early potatoes.

On the road which skirts the hills from Avoca, St. Martins Valley is only about a mile and a quarter from the centre of Christchurch. It forms part of the closely-settled suburb of St. Martins and, probably because of this proximity to the city, its development closely followed or was part of the development of the city. In this respect it differs from Bowenvale, the next valley, which is little further from the centre of Christchurch. Bowenvale was not settled until 1922, when it was sold by Mr. Scott for from £100 to £160 an acre after it had been surveyed and cut up into areas of 1 to 7 acres and a road, electric power, water, and a deep, wide drain which was afterward concreted had been put in by Mr. Scott.

Along the hills beyond Bowenvale the only area of importance for intensive small holding is Lansdowne Valley, which was cut up and settled about 1920; it is about 10 miles from the centre of Christchurch. But between Bowenvale and Lansdowne Valley are two valleys worthy of mention—Cashmere Valley and Hoon Hay Valley, both fairly large and clearly defined. Neither is used for intensive small holding and, though Hoon Hay Valley was cut up several years ago, the holdings are no longer worked because, among other reasons, water was lacking and the aspect was not as favourable as that of the other valleys. Cashmere Valley has not yet been cut up; the sides are eroded and too steep for market gardening, but the valley floor, which is flat and rather low, appears to be suited to some of the crops grown by small holders. Vegetables are grown between Bowenvale and Lansdowne on an occasional small, favourably-situated slope, though total production is not significant.

On the harbour side of the Port Hills, Governor's Bay and Allandale, because of their proximity to Lyttelton, have been small-holding areas almost since the inception of the settlement at the port. Before the Lyttelton tunnel was built, and to some extent before the development of good roads over the hills, the district provided a convenient source of supply for fruit and vegetables for the port and for some of the shipping that used it. As long ago as 1878 there was a well-established apple and cherry orchard at Governor's Bay, and it is known that not inconsiderable quantities of potatoes were grown at Allandale 40 years ago, though the present area in potato production—about 40 acres—was not reached until 10 or 12 years ago.

Moncks Spur-Mount Pleasant

Mount Pleasant is an extensive hill area at the north-eastern end of the Port Hills. It was separated very early from the land used as a sheep run and, though it had been subdivided to some extent and parts of it had changed hands early, its development for small holding dates from about 1920, when a large part of it was cut up and sold. Moncks Spur is a fairly closely-settled spur which juts from the north-eastern face and overlooks the seaside suburb of Redcliffs. Intensive small holding and the production of horticultural crops on Moncks Spur are confined mainly to areas contiguous with Mount Pleasant.

There is still room for development on Mount Pleasant, though suitable areas are limited and must be chosen with discretion. Heavy shelter belts such as are provided by well-grown and trimmed *Cupressus macrocarpa* are essential in most places, and a good supply of water must be assured. Though production is fairly concentrated on Moncks Spur, a majority of the holdings on Mount Pleasant are relatively isolated. Strawberries are grown, and the principal vegetable crops are tomatoes, lettuce, and peas. Flower growing for the late-autumn, winter, and spring markets is also fairly general and is usually carried on in conjunction with vegetable growing; marguerite daisies, shirley poppies, violets, narcissi, and tulips grown for cut flowers are probably most general.

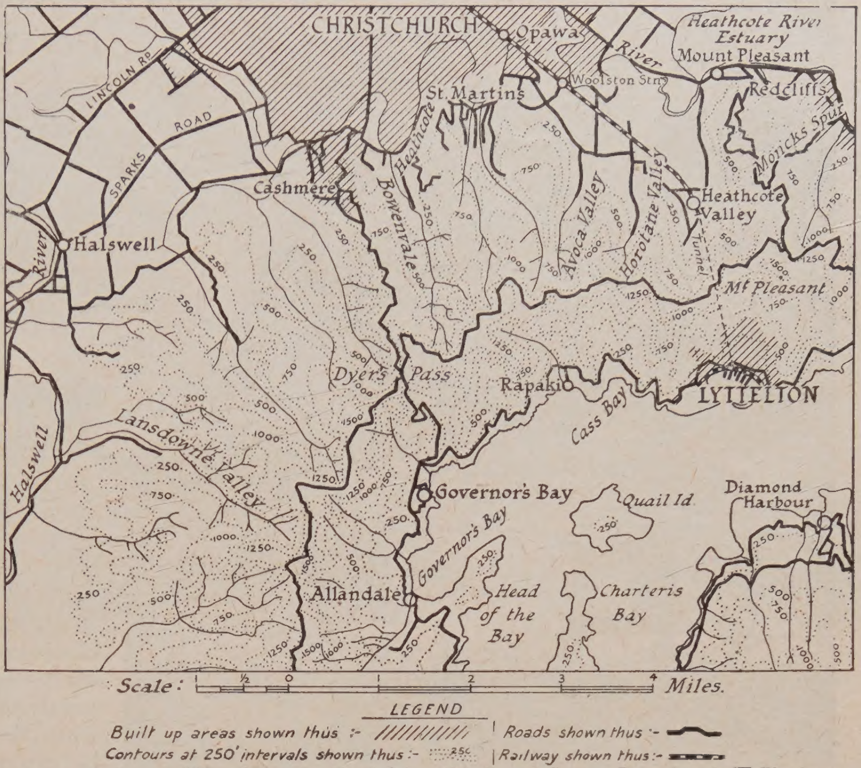
Its distance from the market compared with most other early-production areas is a disadvantage of Mount Pleasant; the road is fairly steep in places and the height above sea level considerable. There are no large glasshouses, and apart from tomatoes and strawberries very little fruit is grown. The growing of horticultural crops is mainly a comparatively-recent development, and the area of such crops is steadily expanding. Home gardeners, particularly on Moncks Spur, are responsible for a considerable proportion of the production of flowers.

Heathcote

Production in Heathcote is confined almost wholly to the slopes of the valley and to land along Bridle Path Road. Most of the land is cultivated and there is little scope for further development unless some form of terracing is adopted. The good, well-drained land on the floor of the valley is now taken up by housing, and the higher slopes, because of difficulty of access and problems of erosion, are hardly economic propositions as yet. Apart from the crops set out in the table on the opposite page some flowers, notably chrysanthemums, violets, and under-glass freesias, are grown subsidiary to other crops and by home gardeners, but they are not very important in the economy of the area. Three acres of outdoor grapes recently planted on fairly-high land for a wine-making firm have given such promise that the area is to be extended by 2 acres.

Horotane Valley

Horotane is the most extensively cultivated of all the valleys. It has a fairly-wide floor and is exceptionally well sheltered yet receives a maximum of sunshine. The greater part of the land sold for small holding is either level or on easily-worked slopes. In general the soil is relatively deep and, as most of the holdings have a sufficient area of level or gently-sloping land for the growing of truck crops, there has been less exploitation than in some of the other valleys of the steeper land with crops the growing of which tend to bring about erosion.


CHRISTCHURCH
Opawa
Heathcote River Estuary
River
Mount Pleasant
Woolston Stn
Redcliffs
St. Martins
Heathcote
Moncks Spur
LINCOLN RD
ROAD
SPARKS
Cashmere
Bowenvale
Avoca Valley
Horotane Valley
Heathcote Valley
Tunnel
River
Halswell
Mt Pleasant
Dyers Pass
Rapaki
Cass Bay
LYTTELTON
Lansdowne Valley
Halswell
Governor's Bay
Quail Id.
Diamond Harbour
Governor's Bay
Allandale
Head of the Bay
Charteris Bay
Scale: ½ 0 1 2 3 4 Miles.
LEGEND
Built up areas shown thus :-
Roads shown thus :-
Contours at 250' intervals shown thus :-
Railway shown thus :-

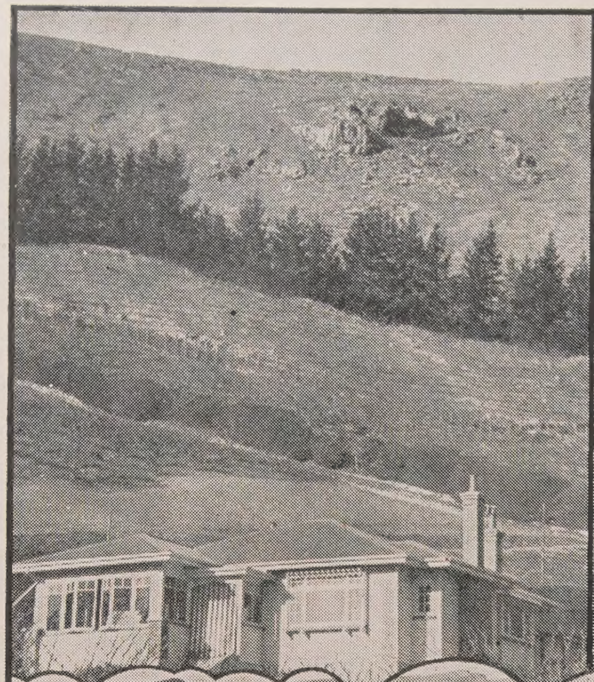
[Map drawn by Head Office, Lands and Survey Department, Wellington.

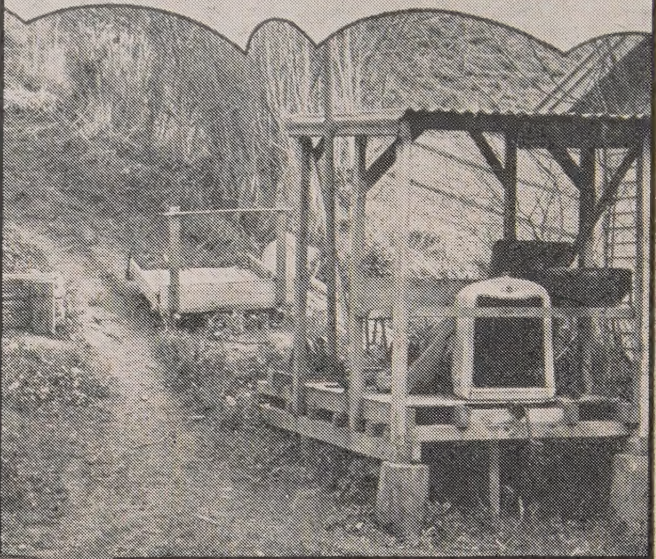
Considerable areas of fruit trees are planted on the higher slopes, and, if an adequate supply of water were assured and the areas planted to suitable patterns, it is probable that production could be increased by further plantings of fruit trees on the higher slopes. Water is supplied from the local reservoir and is insufficient for the heavy demands of irrigation. Early in its development Horotane was planted fairly extensively with apple trees, but they were not successful and apricots, cherries, plums, nectarines, and peaches were substituted. Because of disease and wet conditions at some periods of the year, the area in peaches and nectarines is now greatly reduced and this trend is continuing. Apricots and plums are still being planted.

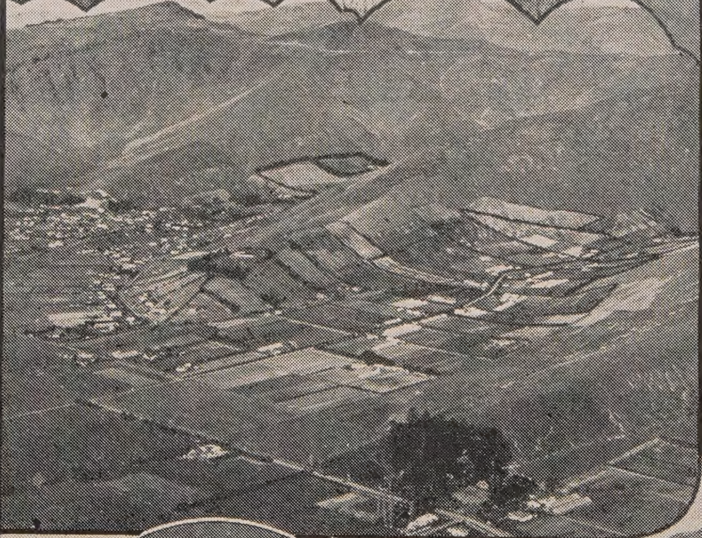
[Green and Hahn Ltd. photo.

A view toward Christchurch from the slopes of Horotane Valley.

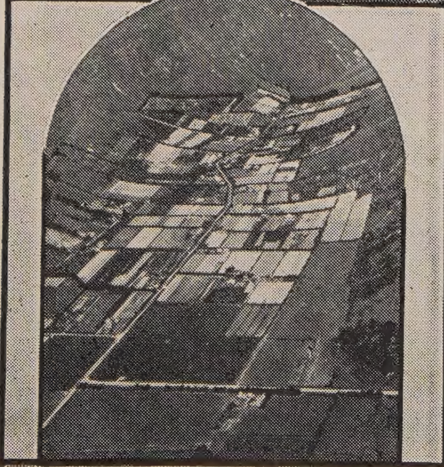
INTENSIVE SMALL FARMING IN THE PORT HILLS

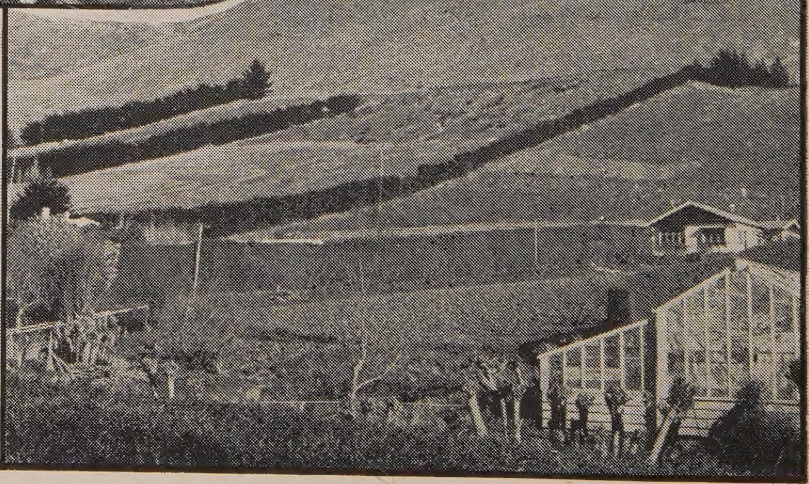






Horotane Valley is exceptionally well sheltered yet receives a maximum of sunshine. Though it has a fairly-wide floor, some of the steeper land is cropped successfully. Above—A stationary engine used for hauling material up a steep hillside in a sledge. Upper left—Orchards planted on the side of the valley. Middle left—This aerial view, looking east, shows the proximity of Heathcote (left) and Horotane Valleys. Lower left—The mosaic of small holdings in Horotane, the most extensively cultivated of the Port Hills valleys. Below—A holding near the top of the valley.





[Photographs at middle left and lower left by V. O. Browne; remainder by Green and Hahn Ltd.

Cherries must be netted to keep off birds and in Horotane, as in the other areas, the cherry orchards are enclosed in high, wire-netted cages, some of which were extensively damaged by the weight of snow which accumulated during a phenomenal snowfall in July, 1945.

[*Green and Hahn Ltd. photo.*

This cherry enclosure in St. Martins was broken down by weight of snow in the heavy fall of July, 1945.

Avoca Valley

Much of the potential value of Avoca Valley as a small-holding area is lost because some of its most favourably-situated land forms part of an estate which was never subdivided and which has now been bequeathed to the Christchurch City Council as a reserve. A considerbale area of steeply-sloping land previously used for growing vegetables and, to some extent, fruit, has now been abandoned temporarily or permanently, though that is not suprising in view of its steepness and the problems presented by its cultivation.

Though modified by the comparatively-restricted area, in general production follows similar lines to that in Horotane except that more flowers are grown. That is probably because the limited area of easily-worked land on some of the holdings impels growers to rely on a range of crops, some of which occupy very little land, rather than entirely on the more common rotations. Marguerites (tree daisies), dahlias, violets, and bulbs, mainly for winter or early-spring cutting, are the principal flowers grown.

St. Martins

St. Martins Valley is an important small-holding district forming part of the closely-settled suburb of St. Martins, and, though the conversion of small holdings to residential areas is taking place slowly, it is an inevitable development. Production is earlier than on the plains land, though a little later than in the other valleys, as it is confined to the comparatively-low valley floor because of the steepness of the hillsides and their use for grazing and residences.

The provision of drainage is important, and most of the early crops are grown on ridges or raised beds because of the tendency of the soil to waterlog. A feature of most of the holdings is the brushwood or low-trimmed fences by which most of the gardens are subdivided into areas of from ¼ to about 1 acre. At one time some of the lower and less sloping valley sides were cultivated to some extent, but the erosion now evident on some of the areas would no doubt be a major factor in their abandonment. As might be expected in a district that tends to develop residentially, the area under glass is comparatively large and this class of production is likely to continue to be important.

[*Green and Hahn Ltd. photo.*

Raspberry plantations in St. Martins. This and the upper illustration show the surface drains and the effects of gully erosion on the hillside.

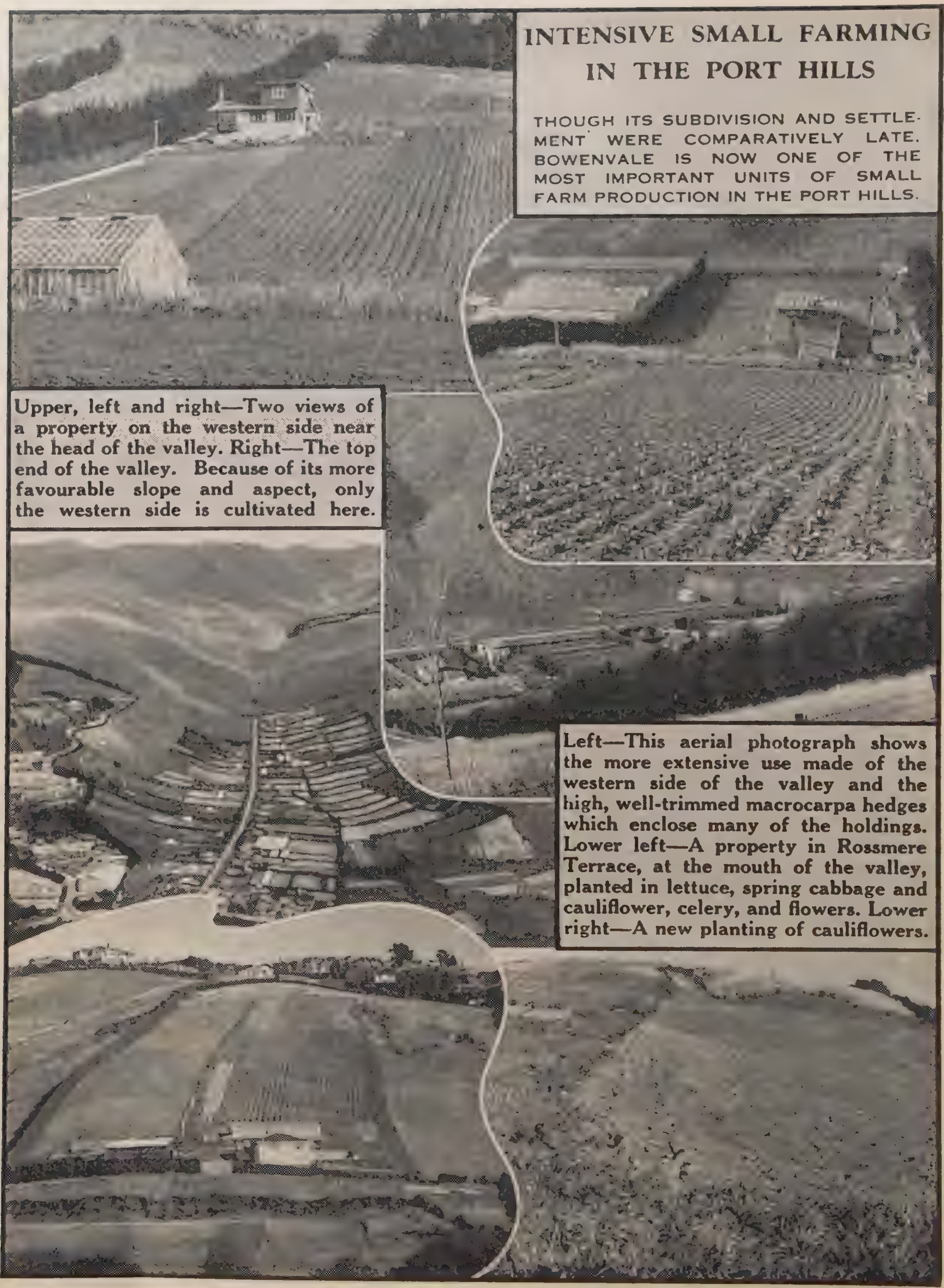
Bowenvale

Though its subdivision and settlement were comparatively late, Bowenvale is now one of the most important units of Port Hills production. Features of the valley are the deep, wide drain that traverses its length and, despite its sheltered position, the high, well-trimmed macrocarpa hedges which enclose many of the holdings. Because of more favourable slopes, production is confined largely to the western side of the valley. There has been some erosion of cultivated land and the fact that there has not been more is a tribute to the growers' skill in cultivation and provision of drains, as the surrounding hills form a watershed of enormous capacity.

The area in stone fruit would be very much greater if a period of disastrously-low prices had not influenced growers to reduce it and plant crops which at the time seemed to offer a better return. Celery is grown for the July to September market and, though it is sent to southern districts and to the west coast as well as to the local market, the comparatively-small acreage appears to satisfy the

INTENSIVE SMALL FARMING IN THE PORT HILLS

THOUGH ITS SUBDIVISION AND SETTLEMENT WERE COMPARATIVELY LATE. BOWENVALE IS NOW ONE OF THE MOST IMPORTANT UNITS OF SMALL FARM PRODUCTION IN THE PORT HILLS.



Upper, left and right—Two views of a property on the western side near the head of the valley. Right—The top end of the valley. Because of its more favourable slope and aspect, only the western side is cultivated here.

Left—This aerial photograph shows the more extensive use made of the western side of the valley and the high, well-trimmed macrocarpa hedges which enclose many of the holdings. Lower left—A property in Rossmere Terrace, at the mouth of the valley, planted in lettuce, spring cabbage and cauliflower, celery, and flowers. Lower right—A new planting of cauliflowers.

[Photograph at middle left by V. C. Browne; remainder by Green and Hahn Ltd.

[*Green and Hahn Ltd. photo.*

A well-cared-for holding at the head of Avoca Valley.

demand. For that reason and probably because of the specialised knowledge required, together with the fact that growing it on its present scale is a comparatively-new development, celery is not grown elsewhere in the valleys except by a comparative newcomer to Avoca who farms land suited to the crop.

Lansdowne Valley

Though about 10 miles from Christchurch, Lansdowne Valley is a small-holding area of some importance. It was opened up about 1920, when there was something of a boom in land, and sold at from £100 to £150 an acre. When the valley was cut up some excellent land at its mouth was retained as an assembly area for sheep from the surrounding high country. That and the steep slopes of the valley sides limit the area available for intensive small farming. Only about 25 acres are now in cultivation, which is considerably less than when the valley was first opened up.

During the first few years mainly peas, potatoes, and tomatoes were grown; the peas and potatoes have now given way to raspberries, of which there are about 6 acres, and to apricots and plums. The soil on the valley floor is excellent, but is somewhat subject to flooding. Much of the hillside land previously cultivated has now been returned to grazing; some of it changed hands fairly frequently, and its fertility declined rapidly because of poor husbandry and erosion.

Water has always been a problem in the valley, and production undoubtedly could be increased if an adequate supply were available for irrigation. The stream which runs through the valley dries up at times, but because of the great watershed provided by the surrounding high country it quickly becomes a torrent after heavy rain, and much work has been done by some of the landholders in straightening and deepening its bed. The sinking of good wells is necessary to increase the water supply in dry weather, but skilled labour for well-sinking is scarce. Early in the development of the valley rabbits and hares were troublesome, but now opossums are a greater nuisance.

Because of its isolation, during the past fruit season it was necessary to transport fruit pickers to the valley from Christchurch in the morning and return them at night. Only three glasshouses have been built in the valley and all have now been dismantled, but a fruit grower whose farm is near the mouth of the valley has two glasshouses.

Governor's Bay-Allandale

Both Governor's Bay and Allandale are on the south-western or harbour side of the Port Hills. The area of cultivated land at Governor's Bay is relatively small and consists of a fairly-short, narrow strip of land above the harbour along the foot of the hills. It loses the sun early, and its development as an early-producing area must be ascribed largely to shelter and to good cold-air drainage and consequent freedom from frosts rather than to exposure to the sun. Allandale is an adjoining area which not only has identical advantages of shelter and freedom from frost but, because it consists of land across part of the head of the harbour and more to the south, it is sufficiently far away to avoid most of the restriction on sunlight imposed by the Port Hills, which appear to closer areas as a great wall which, particularly on a winter day, shuts off the sun at an early hour.

[*Green and Hahn Ltd. photo.*

A steep but well-cultivated holding at the mouth of Avoca Valley.

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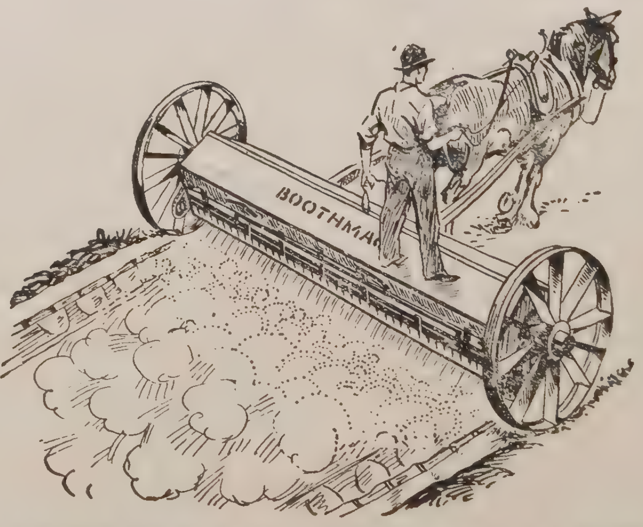

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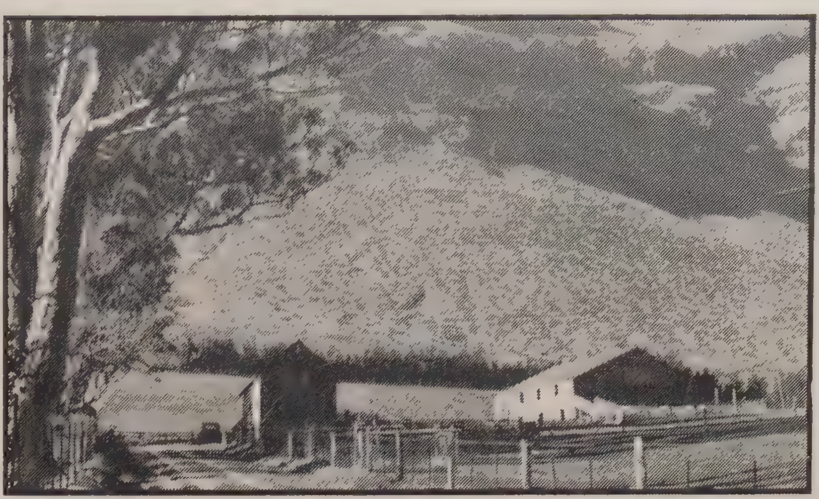
Comparatively little fruit is grown at Governor's Bay and production is confined largely to part-time growers, but Allandale, with some scattered areas at the head of the harbour, is the main Christchurch source of supply for early potatoes, which are sold in cases. About 10 acres of tomatoes and several acres of late peas are also grown in Allandale. Tomato growing and occasional incursions into the growing of other vegetable crops such as spring cabbage are comparatively recent and became reasonably attractive to growers with the development of modern motor-trucks and improvements to the road to Christchurch. The 10 miles from Allandale to the centre of the city can be covered easily in a loaded truck in from half to three-quarters of an hour. Water is not a problem as on most of the areas on the northern side of the hills; the crops grown and the less steeply-sloping land are the main factors in this, but the presence of natural springs makes a shortage of water unlikely even if different crops were grown.

Though all the good land in Allandale and Governor's Bay is now occupied, there are some possibilities of development for intensive small holding on limited areas of good land, some of it not yet subdivided, around the head of the harbour, though the distance from the market is greater and some of the best land has been set aside as a reserve.



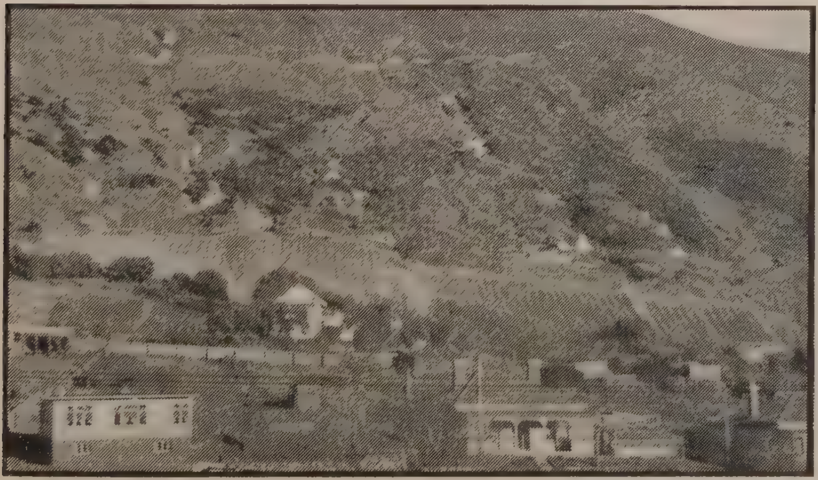
[Green and Hahn Ltd. photo.

A hill area of Heathcote Valley the terracing of which has been suggested. Though it appears fairly even, it is marked by many under-runners, or "Maori drains," and even the small area ploughed at the lower left (seen just over the top of the shed) required several days' work with a bulldozer first. At present sheep are raised on the land.

Climate and Water Supply

In general, with the exception of celery the same kinds of fruit and vegetables are grown in varying quantities in each of the small-holding areas of the Port Hills. Comparative warmth, freedom from frost, and a longer growing season make the areas especially suitable for the production of early, late, and half-hardy crops, as well as certain kinds of small fruit, stone fruit, and early and late cut flowers.

Accurate meteorological information for the valleys is lacking, but, judging by records of frosts kept by one grower, the lower temperatures are at least 8 degrees F. higher than those recorded in Christchurch. There is also reason to believe that rainfall is lower than the average of about 25in. recorded in Christchurch. Production on the hills is often affected adversely late in the season by lack of water, as the supply to most of the areas is insufficient to provide adequate irrigation of fruit and many vegetable crops.



[Green and Hahn Ltd. photo.

The west side of Heathcote Valley. The large, partly-eroded area above the cultivated land has been burnt off and is being planted in trees to check the erosion.

Cultural methods are generally efficiently carried out with modern mechanical equipment and, as is usually the case where vegetable crops are forced into early maturity, fertiliser applications are liberal.

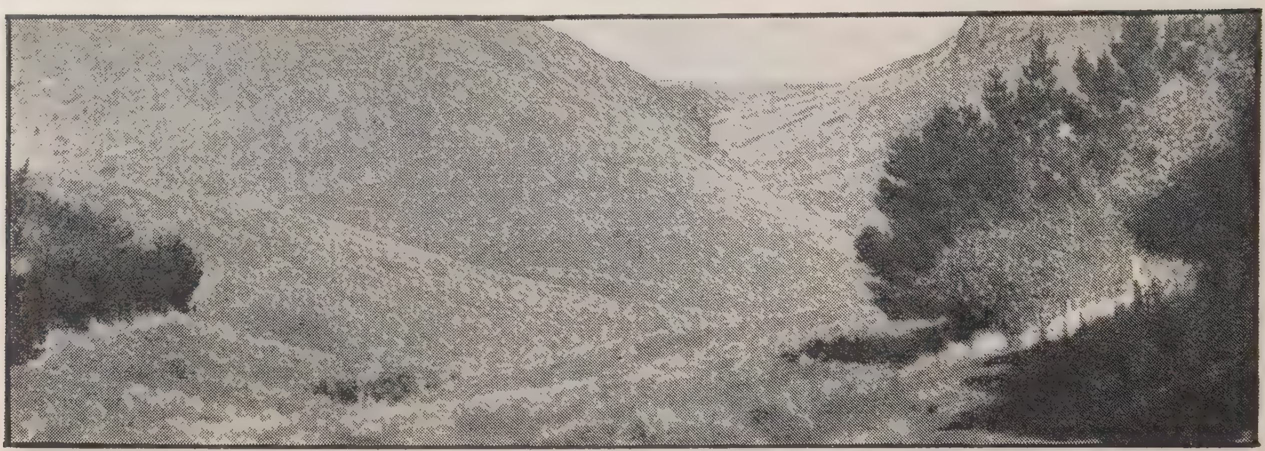
Working of Steeper Land

Erosion and the abandonment of the steep, higher slopes are noticeable throughout the area, though the ingenuity and skill with which some growers continue successfully to crop extremely-steep areas prove that erosion is not a necessary corollary to such cultivation. For instance, two growers working steep land have installed stationary engines with cables and sledges for haulage. Some of the land planted in fruit trees is too steep for mechanised cultivation and must be cultivated by hand. Replacement of soil on higher levels with a scoop has also been tried with some success.

Apart from erosion, which is a serious problem, the permanent or temporary abandonment of some of the higher and steeper slopes is largely an economic result. Work on such land is more strenuous and difficult than on level land of comparable area, there is often an element of risk where heavy implements are used, and, though the returns are not always commensurate, the financial outlay is usually much greater than for level land. Thus for many of the older and well-established growers there is not the same inducement to work high, steep slopes as, for instance, there would be for younger growers whom financial necessity might impel to exploit as much land as possible.

Strawberries and Raspberries

After a period of rest for the soil, the introduction of new stocks and varieties of strawberries has led to a recent increase in the area planted.



[*Green and Hahn Ltd. photo.*

Rough land at the head of Avoca Valley. An easy top-gear route to Lyttleton was once envisaged by the construction of a road up this valley and a short tunnel through the ridge at the top.

That followed several years during which the area in production decreased progressively because of low yields, which were attributed mainly to the soil being "strawberry sick," to disease, and to the growing of varieties of low vigour.

Raspberry growing is confined mainly to areas which are specially suitable on the valley floors of Bowenvale, St. Martins, and Lansdowne, so the area planted remains fairly stable. Because of the intensive nature of production most of the holdings are small. A considerable area of the land is cropped twice a year, and, as most of the holdings have at least one glasshouse, usually 100ft. x 30ft., a well-equipped economic unit need be of only about 3 acres, though the average, especially where stone fruit is grown, is somewhat larger.

Insect Pests and Diseases

Vegetables and tomatoes: With the exception of celery, which is sprayed against leaf spot (*Septoria apii*), and spring cabbage seedlings, which must be sprayed in the autumn against the diamond-backed moth and white butterfly, little spraying is done. Tomatoes are occasionally sprayed against early or late blight and lettuces occasionally against rust or ring spot (*Marssononia panatoniana*), which in some seasons causes serious reduction in yields. The cause of the greatest economic loss is the virus disease spotted wilt; tomato crops suffer chiefly, and the type of rotation practised, tomatoes following lettuce, specially favours the carry-over of the disease.

Fruit: Though diseases such as die back (*Clasterosporium carpophilum*) and shot hole (*Phyllosticta prunicola*) occasionally cause damage, brown rot (*Sclerotinia cinerea*) and silver leaf (*Stereum purpureum* Pers.) are the principal diseases of fruit. Insect pests are readily controlled by spraying. Physiological troubles caused by wet root conditions at certain periods of the year have forced many growers to replace some kinds of fruit trees with more adaptable stock. Late frosts are occasionally responsible for damage on the lower slopes.

Settling of Ex-servicemen

The Port Hills area has played a part in the rehabilitation of returned servicemen from both world wars. After the 1914-18 war Horotane and Avoca were the principal sites because at that time both valleys had been cut up and sold only recently. A number of holdings, including some bought speculatively, were resold to returned servicemen at considerably-increased prices. However, that factor did not militate against the returned men as much as might be expected, as the relatively-high prices were an inducement to sell and in many instances the owners would have been wiser to have retained possession. Horotane was largely settled by returned servicemen.

Because the areas were already settled and the market-garden industry well established, rehabilitation developed rather differently after the Second World War. Relatively few holdings came on the market, and there is a natural tendency for the good properties to pass from father to son. Fourteen men have been rehabilitated on small holdings on the Port Hills area and a further six are training or have trained there.

[*Green and Hahn Ltd. photo.*

The mouth of Avoca Valley near the entrance to the reserved area.

DISABLED SERVICEMEN'S
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FLOWERS

ON the 58-acre homestead block of a Manawatu farm men who in the service of their country suffered injuries which left them with pension disabilities of from 40 to 100 per cent. are learning to reinstate themselves on the land as active producers in the community. Some of them had abandoned hope of ever being able to work again but, inspired by the example of their fellow trainees and their supervisor, a disabled ex-serviceman farmer of the First World War, they have surprised themselves with the progress of their training. Each man now looks forward to the day when he will again be earning his livelihood on a small farm of his own at the end of his 2 years' training. A great improvement in the general health of the men has been another gratifying result of the farm's operations, which are described in this article by W. E. Leadley, general secretary of the Disabled Servicemen's Re-establishment League.

SHORTLY after the outbreak of the Second World War the Disabled Servicemen's Re-establishment League was appointed by the Rehabilitation Board as its agent to be responsible for the training of disabled ex-servicemen in new trades and occupations. The league's officers interviewed all ex-servicemen with pension disabilities of 40 per cent. or more, and during this work they found a number of men who had been accustomed to working outdoors before the war—such as farmers and public works employees—and were not attracted by the prospect of learning an indoor occupation; despite the major disabilities which many of them suffered, they still yearned for an outdoor life.

The league held that these men were just as entitled to be assisted to re-establish themselves in civil life as men who desired to become tradesmen. Therefore the Government was approached to provide a suitable property, and when a 340-acre farm at Milson was bought for soldier settlement the homestead block was set aside for use by the league as a training farm. The State also provided finance for the initial establishment of the training farm, including the erection of new buildings, purchase of stock, plant, and machinery, and the subsidising of wages during training. The league was assisted in its plans by officers of the Department of Agriculture and the Lands and Survey Department, who were appointed to the league's headquarters farm committee, and a local farm committee, composed of practical farmers and Government and league representatives, was appointed to supervise closely the development of the property as a model training farm.

Conditions of Training

Before entering the farm a prospective trainee must be approved by the league liaison committee in the district in which he lives. If this committee recommends his training, the Rehabilitation Board approves the subsidising of his wages. Each trainee is accommodated in a furnished single man's hut, and a wage of £5 15s. a week is paid during training, of which £1 is charged for board. Most of the food is grown on the farm.

The farm has 19 trainees at present, recruited by league field officers from all parts of the Dominion. Their average pension disability is 70 per cent. due to sickness and wounds incurred in war service. However, despite these severe disabilities, the men have entered seriously on their training. A fine spirit of comradeship prevails, and they have established a good reputation among residents of the district.

Training Courses

Dairying, pig farming, poultry farming, market gardening, horticulture, fruit farming, flower and seed raising, and general hothouse work are included in the training courses; steps are being taken to include beekeeping in the near future. All trainees, in addition to the course in which they wish to specialise, are required to undertake a general farm course.

DISABLED SERVICEMEN'S TRAINING FARM

Part of the White Leghorn flock in the poultry section of the farm.

The method of training adopted by the supervisor has proved very successful. In each branch of the work a trainee is selected because of his keenness and is given detailed practical instruction. When he is considered efficient he assists the supervisor to instruct others in this work. This method has produced some very efficient trainees, who increase their own knowledge while assisting to train others. This spirit of mutual help is one of the secrets of the success of the farm.

Instruction is also given by many officers of the Department of Agriculture and other specialists.

Dairying and Pig Farming

In a new and up-to-date cowbail 34 Jersey cows are milked. Each man spends 2 months on a dairy farming course before passing on to the pig breeding section.

Pig farming has proved a most interesting study to most of the trainees. Before taking over his present position the supervisor, Mr. M. Roderique, was supervisor to the Otago and Southland District Pig Council and, later, to the Taranaki District Pig Council. One of the most modern piggeries in New Zealand has been erected on this property, housing a stud herd of 25 Large Whites. Last year two entries were made at the Manawatu and West Coast A. and P. Show, and the trainees were gratified to learn that, on the first occasion on which the farm had entered stock at a show, their sow had won the championship, beating the Royal Show champion and also taking first prize in the class for sow and litter.

During the past 10 years pig farming has declined in popularity in New Zealand, but among the men at the farm no branch of training is more popular. Many of them have revised their opinions since having practical experience of pig keeping. When they first came to the farm they regarded pigs as unclean animals and the industry in general as uninteresting and dirty. Recently, however, when a survey was made of trainees who had been at the farm for more than a year to ascertain the kind of farming they wished to take up on the completion of their training, almost all stated a preference for dairying and pig farming. In the coming year the farm will have a greatly-increased stock of Large Whites, both for exhibition and to meet an increasing demand for sales.

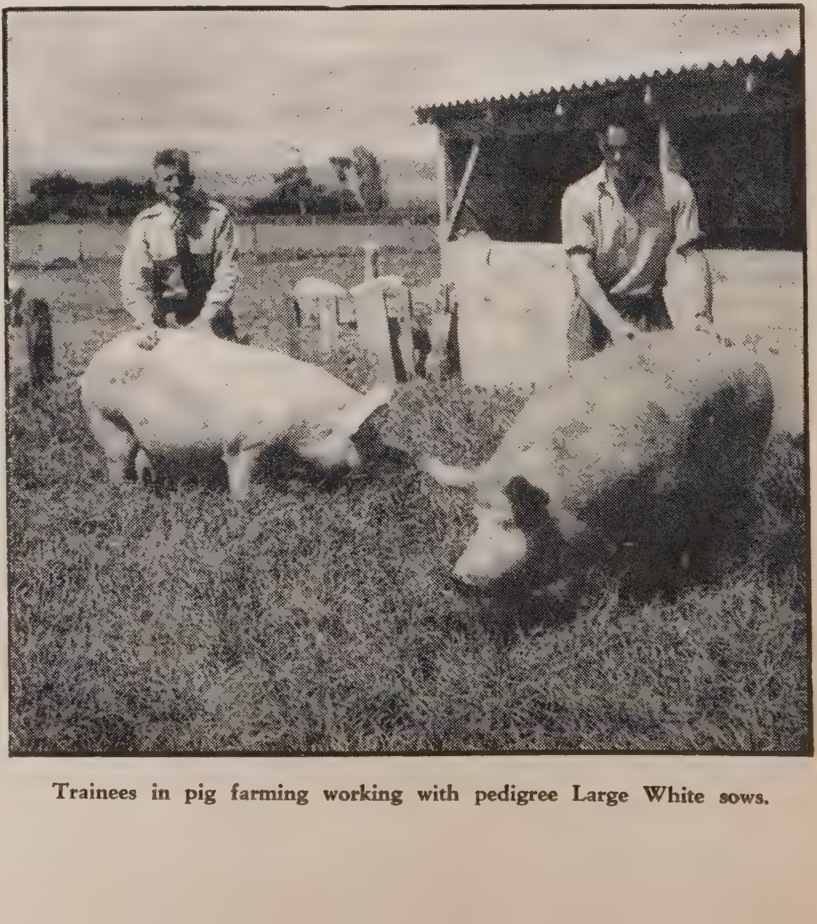
Poultry Farming

As it has been found that few trainees wish to specialise in poultry keeping, this section of the farm is not extensive. It contains 200 White Leghorns, and the men are instructed in the feeding and care of the flock, incubation, egg testing, and the raising of chickens. Day-old chicks and 9-weeks-old pullets are sold.

Market Gardening

All trainees are required to take a full course in market gardening, one of the main activities of the farm. Preparatory cultivation work is done with a small tractor and inter-row cultivation with a motor cultivator. The men have done very well in this branch of the work.

This section of the farm contains 9 acres, crops on which include potatoes, carrots, parsnips, peas, beans, silver



Trainees in pig farming working with pedigree Large White sows.

The trainees' accommodation huts, set amid gay flower beds. The interior of one of the huts is shown below.

beet, cabbage, lettuce, onions, tomatoes, leeks, celery, cucumbers, pumpkins, and marrows. (This produce is sold at a roadside shop which has been built at the entrance to the farm by the trainees.) A small orchard consists of apple, pear, peach, apricot, and plum trees. Field crops include mangolds, chou moellier, and hay.

Hothouse Work

On the original estimates for capital expenditure at the farm was £600 for the erection of a glasshouse. It was found that the whole of this amount would be required for the erection of a glasshouse 40ft. by 30ft., but the supervisor and the trainees felt that with some expert supervision and a little instruction they could build the glasshouse themselves. The services of a retired man were secured to instruct selected trainees in glass cutting and glazing, and the disabled men soon showed that they were capable of building an excellent glasshouse and effecting a considerable saving in costs. With this saving it was possible to buy a propagation house in Palmerston North. It was demolished and re-erected at the farm by the trainees without any instruction and with the loss of only 6 panes of glass. Thus the farm has an up-to-date glasshouse and a propagating house, both of which have been passed by the Kairanga County Engineer as first-class structures, and a small surplus still remains from the estimated cost of the original glasshouse. The construction of these houses was begun on May 1, 1948, and completed by the end of the following month. Five months later the large glasshouse contained an excellent crop of tomato plants bearing fruit.

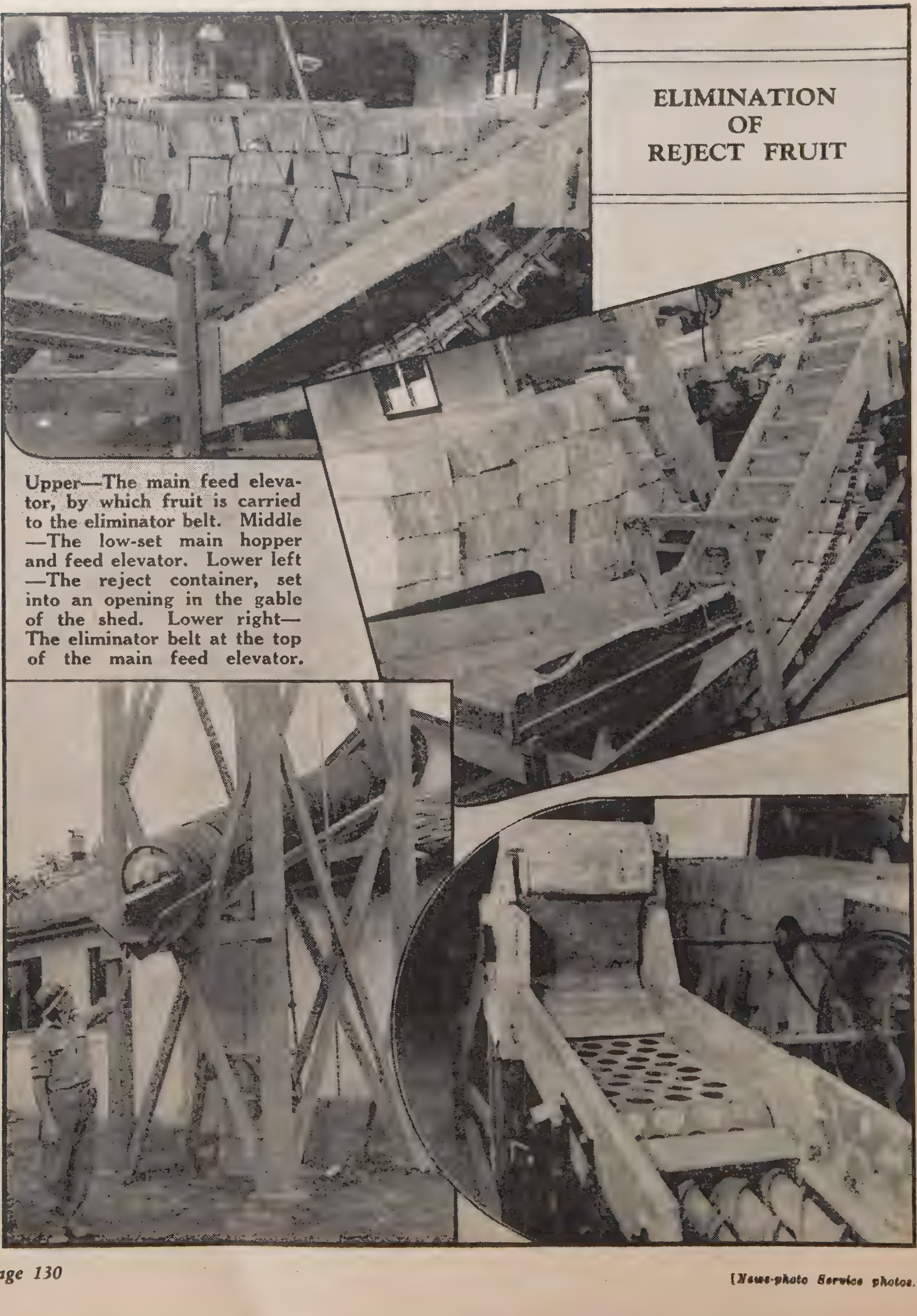
The propagation house is a source of much interest to the trainees, for in addition to the general line of plants grown each man is encouraged to propagate his favourite line of plants as a hobby. A large variety of blooms is expected to be available for marketing in the coming year. Vegetable and flower seed is collected, sorted, dressed, and used for propagation in the hothouse; any surplus is sold to seed merchants, bringing good prices.

Settlement of Trainees

The Rehabilitation Board is making special endeavours to obtain suitable small farms for these disabled men. The name of each man and his grading as assessed by the Palmerston North Grading Committee are forwarded to the board at least 6 months before the completion of his training to avoid, if possible, a long wait between completion of training and the settlement of the trainee on a property of his own.

In the near future 4 of the trainees will complete their training, and it is hoped that small farms suitable to men with their disabilities will be available to allow them once more to contribute to the economic life of the community.

ELIMINATION OF REJECT FRUIT



Upper—The main feed elevator, by which fruit is carried to the eliminator belt. Middle—The low-set main hopper and feed elevator. Lower left—The reject container, set into an opening in the gable of the shed. Lower right—The eliminator belt at the top of the main feed elevator.

[News-photo Service photos.

Elimination of Reject Fruit from Packing Shed

Device Simply Adapted to Grading Machine

THE handling and disposal of reject and undersize fruit in packing sheds often present a problem to fruit growers and can involve much labour and shed space. Special grader equipment of an automatic and unusual type to handle such fruit economically is described in this article by K. H. Spackman, Horticultural Inspector, Department of Agriculture, Hastings. Fruit growers will find the equipment comparatively simple to adapt to almost any type of fruit-grading machine at a relatively-low cost.

THE equipment consists of a feed elevator which carries the fruit from the hopper of the grader on to an eliminator belt, which sorts out undersize fruit, and an escalator which carries reject fruit to a container, outside the packing shed, consisting of a series of telescoped drums. The whole equipment is driven by a ¼ h.p. electric motor as an independent unit from the grader motor.

Feed Hopper and Shed Size

An extra 7ft. in the length of the shed is required to accommodate the equipment, as the main hopper is set back further than normal and down to a level of 2ft. 3in. from the floor. The low set of the hopper makes easier the work of supplying fruit to the grading machine.

The Feed Elevator

The fruit rolls forward from the main hopper on to a feed elevator, set at an angle of 45 degrees to the main machine. The feed elevator is 6ft. long and 12in. wide, and consists of canvas shelving spaced 6in. apart fitted on an endless double chain in escalator fashion and driven by the ¼ h.p. electric motor.

When the fruit reaches the top of the feed elevator it discharges from behind a protective canvas curtain on to the eliminator belt before passing on to the grader. This protective curtain breaks the fall of the fruit and reduces the risk of bruises.

The Eliminator Belt

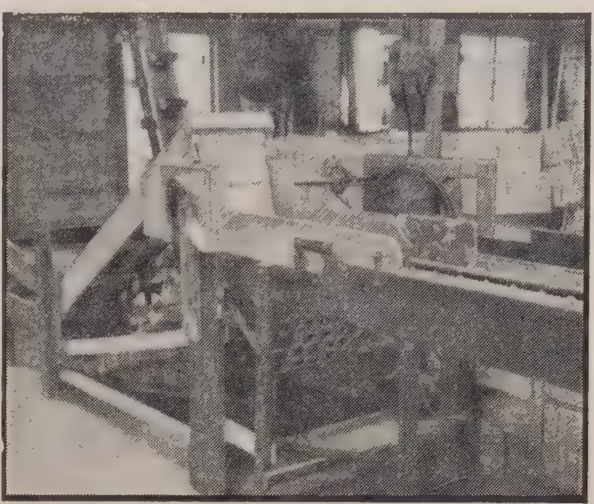
The eliminator belt is 2ft. long and is situated in the position previously occupied by the feed hopper. It comprises an endless 12in. wide, 3-ply, heavy composition belt, with a series of circular holes cut throughout its entire length according to the largest of the undersized fruit to be eliminated from the grader; for example, if a 2⅜in. apple is the minimum to be packed, a belt with 2 5/16in. holes is fitted, a difference of 1-16in.

Belts with holes of varying sizes are kept on hand and the time required for a change to be made is negligible.

Undersized fruit dropping through the eliminator belt passes to a small feed hopper supplying the reject elevator. Fruit of the size required for packing passes over the belt to the sorting table. All fruit rejected from the sorting table is placed on a belt which returns it to the reject hopper.

Reject Escalator

An outstanding feature of the equipment is the reject escalator, also driven from the ¼ h.p. motor. A 2½in. wide endless canvas belt, supported at the rear by a 6in. x 1in. board placed at an angle of approximately 15 degrees to the vertical, travels upward from near floor level and close to the reject hopper to an opening in the shed gable. Tin cups 5in. long, 4in. wide, and 2in. deep are attached to the belt pick-up at 10in. intervals.



[*News-photo Service photo.*

The complete unit, which is driven by a ¼ h.p. electric motor.

Reject fruit rolls into the cups from the small hopper, and at the top of the upward journey each cup tips, the fruit being discharged into the telescoped drum container.

Reject Container

The reject container, situated outside the shed, is constructed of 6 telescoped 44-gallon steel oil drums with bottoms removed set on a wooden stand at an angle of 30 degrees from the horizontal. The uppermost drum is set into an opening in the shed gable corresponding with the top of the reject escalator, and the last drum is fitted with a hinged trapdoor, 6ft. from ground level, to enable fruit to be loaded by gravitation directly and quickly into a lorry. The capacity of this container is approximately 50 bushels (approximately 1 ton of fruit).

The advantages of this system are:—

1. The elevator feed enables the main hopper to be set low, thereby reducing the lifting of cased fruit to a minimum and also the risk of damage to the fruit.

2. The elevator feed provides an even flow of fruit on to the eliminator belt and therefore on to the sorting table for the graders to handle.

3. An eliminator belt is fitted according to the requirements of the variety being packed. Consequently no fruit below minimum size passes to the sorting table, and the sorting of grades is speeded up and carried out more efficiently, with a decided reduction in labour costs.

The result is accurate sizing of the smallest allowable size in the end bin of a weight-type grader and less risk of odd small apples weighing into a bin containing larger fruit.

4. All small and reject fruit automatically passes out of the shed into the container for temporary storage and speedy removal. This container is easily cleaned if necessary.

5. Labour to handle reject and undersize fruit is considerably reduced.

6. No valuable shed space is taken up by this fruit, and no cases are made dirty by rejects.

7. The equipment is quiet in operation.

Acknowledgment

Thanks are due to Miss L. P. Craig, Orchardist, Pukahu, Hastings, for assistance given in the supplying of details of the equipment installed in her packing shed.

The design of the eliminator part of the equipment described is adapted from a special fitting to an old-established and well-known type of weight grader.

CARE OF LIVESTOCK DURING MARCH

Contributed by the Animal Research Division.

FEED HAY TO CALVES

CALVES should have access to good hay at all times. It is particularly valuable after the first autumn rains and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly-growing pasture. Make sure that the calves are rotated through the paddocks at intervals of a few days. Set stocking at this time of the year is bound to result in scouring, unthriftiness, and some deaths.

* * *

SLEEPY SICKNESS IN EWES

Sleepy sickness, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in the autumn for grazing by the ewes for 3 weeks before lambing.

* * *

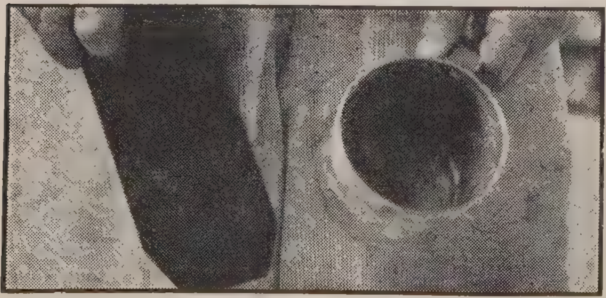
LEAD POISONING IN CATTLE

Many cattle die from lead poisoning every year and the commonest source of lead on the farm is paint. Make sure that old paint tins are burnt or buried and do not allow cows or calves to lick surfaces from which paint is flaking.

* * *

DRYING OFF OF DAIRY COWS

To dry off a dairy cow simply stop milking her. This is quite safe and effective. Before a cow is dried off the milk from each quarter should be examined in a strip cup. If there is any sign of mastitis, give a course of treatment with penicillin before drying off and inject a tubeful into each infected quarter after last milking. If a quarter affected with mastitis feels lumpy, it is not likely to return to full production. Unless the cow is a very good producer she should be culled.



A piece of tin painted mat black placed aslant in an aluminium mug makes a good improvised strip cup for examining the milk from each quarter before a cow is dried off.

[*News-photo Service photo.*

CULLING OF EMPTY COWS

It is a good plan to have all cows examined by a veterinary surgeon to determine if they are in calf. A cow should never be culled for sterility without such an examination, as many cows thought to be empty have proved to be in calf when slaughtered at the works. The presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent. of such cows hold when mated in the following season.

* * *

BLOWFLY STRIKE IN SHEEP

Blowfly strike is likely to occur in showery autumn weather when the humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool so as to leave a clean margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat with a good non-irritant dressing and be careful to collect and destroy the maggots, as if these are allowed to fall to the ground, they are capable of hatching into flies.

* * *

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under 6 weeks old, they can be prevented only by vaccinating the ewes. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection. Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirits and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over 6 weeks old. Where such losses occur it is necessary to vaccinate the lambs themselves.

Avoiding Losses in Calves after Weaning

By D. MARSHALL, Livestock Superintendent, Department of Agriculture, Palmerston North.

CONSIDERABLE mortality occurs in dairy calves, sometimes in beef breeds too, during the post-weaning period, that is, in about the second 6 months of their lives and at a stage when considerable time and food have already been invested in them. This article sets out the common causes of death in young stock and describes the steps which farmers should take to avoid losses.

DEATH appears to be due to three factors: 1, Circumstances of actual weaning and the condition of the calves at that time; 2, internal parasites; and 3, a poor level of feeding in the post-weaning stage, amounting, sometimes, to semi-starvation.

In weaning the aim should be to make a gradual change in the type of food. Under natural conditions, such as occur with the beef breeds, the calf is running with the cow and sampling the varied diet which she takes. As the maternal milk gradually dwindles the calf comes to rely more and more on the other foods until it is getting nothing else. With dairy calves a similar process should be the aim. Most calves become accustomed to grass at a very early stage and most weaning takes place at a time when green grass is still available. However, as semi-drought conditions are not uncommon in some districts during February-March, supplementary feeding may be necessary, and if hay is used, calves should have some acquaintance with it while still on the bucket. It is unlikely that silage will be available for calves until it is necessary to feed it to the herd, but as soon as silage is fed out calves should have a small allowance to accustom them to it. The same gradual introduction should be made to any other hand-fed ration such as green lucerne, soft turnips, etc. A good supply of drinking water should be readily available, since the weaner will miss the fluid of its milk diet greatly during the hot weather which usually prevails in the autumn.

Parasites

By far the most important parasites of the calf in its first year are the small stomach worm and intestinal worms. As the worms are very small a careful examination of the stomach lining is necessary to detect them in the dead animal. Symptoms of infection by these parasites may be rather indefinite: Some unthriftiness, gradual loss of condition, anaemia—evidenced by undue paleness of lining membranes of the eyelid and nostril—and probably a certain amount of diarrhoea.

To understand and apply principles of control of internal parasites some idea of their life history is necessary. The worm does not multiply in the host calf. If a large number is present, each has been picked up as an infective larva during grazing. The adult female in the infected calf lays many eggs, which are passed out in the droppings, and where conditions are reasonably favourable the egg develops. The microscopic worm is still encased in a shell membrane, which is renewed, usually twice, at which stage the larva is infective. Not only is it now capable, if swallowed by the proper host, of completing its life cycle and developing into a harmful parasite, but provided conditions remain suitable it may survive in the open for long periods—up to 12 months—and still be capable of completing its cycle. As a result of much investigation of the free larvae it has been found that they have a high mortality rate and while the favoured ones may hold out for 12 months, most die within 3 weeks of reaching the infective stage, if not picked up by a suitable host. They have little chance of sur-

HEADING PHOTOGRAPH: **Shelter, which conserves body heat and so reduces the amount of feed required, is highly important for young stock.**

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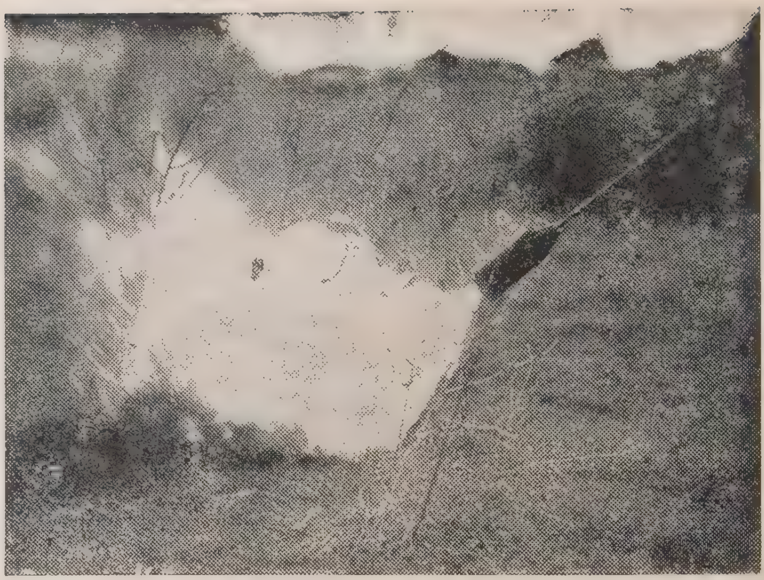

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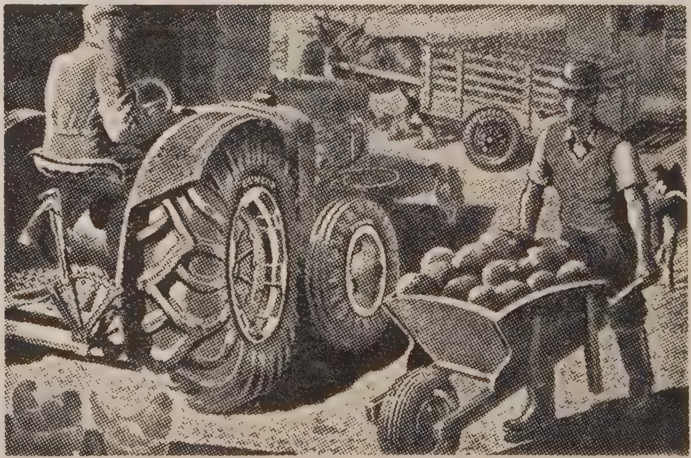

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IMPORTANCE OF GOOD FEEDING

Most calves become accustomed to grass at a very early age.

vival if picked up by a mature animal—a cow or bullock—so that grazing out a calf or weaners' paddock with mature stock will kill off many parasites. Grazing with animals of another species such as mature sheep will have a similar effect.

In order to be swallowed by its proper host the larva must leave the soil on which it has developed and ascend the stem of some pasture plant, which it does when plants and atmosphere are moist. In dry periods or during the heat of the day the parasites withdraw to a lower level. The repetition of this pilgrimage several times must make considerable demands on the vitality of the larva. Certain plants such as clovers apparently provide more suitable conditions for the parasites, since the clover leaf on its under surface is moister and more protected than the leaves of the more-erect-growing grasses. Remarkable evidence of larval vitality is shown by the fact that from infected pastures which were ploughed, worked, and resown immediately with temporary pasture, larvae were later recovered before any fresh infection could have occurred. Dry conditions are unsuitable for development, but a prolonged dry spell where pastures are being constantly contaminated by infective droppings may result in a rather sudden and heavy infestation of susceptible young stock as soon as the first rains come to stimulate larval activity. Harrowing of pastures to break up droppings has some beneficial effect.

The eminent American parasitologist Hall had a slogan: "Permanent pastures perpetuate parasites." However, certain steps can be taken to reduce the risk of parasite infestation of the young animal. The first is frequent changes of pasture—rotational grazing. Since a period of as short as 3 weeks without stocking (by susceptible or infected young stock) will result in many larval worms dying off, the number picked up at the end of that time will be so much less. The excellent results at Ruakura Animal Research Station, where rotational grazing of calves ahead of the dairy herd has enabled drenching for worms to be dispensed with, indicate the value of such grazing. Even where it is not possible to move young stock as frequently as is done at Ruakura changes should be made whenever opportunity offers and it would seem important to shift the young stock from any area they have occupied for several weeks as soon as autumn rains occur.

Maintaining the animals in good condition by adequate feeding is the second safeguard against parasite infestation. The effect of poor general condition in reducing resistance to parasites was shown in one of the earlier bush sickness experiments. In order to prove the need for cobalt on the area two lots of lambs were grazed in turn over the same four paddocks, but one lot were supplied with a lick trough containing cobalt. Lambs having access to the lick made good normal gains in weight, but the others went back badly. In addition, however, the former when slaughtered were found to harbour very few parasites, while the poor-conditioned lambs, which had grazed over the same area, were rather heavily infested.

The third important aid to parasite control is routine dosing with an effective worm medicine. Probably the most effective is phenothiazine, though its cost makes repeated use somewhat expensive. In a few instances calves after drenching with phenothiazine have developed an inflammatory condition of the eyes when exposed to sunlight, but these cases occur too seldom to be viewed seriously. Any ill effect may be avoided if the calves are under observation for 24 hours after drenching and at any sign of weeping are put into a shed out of the light for a further 24 hours, when any risk should be past.

Bluestone-nicotine is also a useful worm drench, though less effective than phenothiazine, with which it may be alternated. Whether drenching should be undertaken or not will depend on management and on past experience. Where losses attributable to parasites have occurred in previous autumn-winter periods and no radical modification of management, with change of grazing methods, has been made or is possible regular drenching should be carried out. If veterinary advice is readily available, examination of a small mixed sample of droppings from several calves could be made and would give an indication of degree of infection. Disappointing results may follow drenching if the drenching programme is delayed until calves are already becoming anaemic and debilitated or if the correct dosage is not adhered to. (Dose rates are explained fully on the packages of all proprietary preparations.)

Certain plants such as clover apparently provide more suitable conditions for the small stomach worm and intestinal worms which infest calves, since the clover leaf on its under surface is moister and more protected than the leaves of the more-erect-growing grasses.

Lungworm

Much that relates to stomach and intestinal parasites applies also to lungworm, though in New Zealand lungworm is probably seen more often in younger calves (before weaning) and it is much less widely distributed than stomach and intestinal parasites. The free larval forms are less resistant to dry conditions. Symptoms are characteristic—periodic attacks of severe and distressing coughing, which weaken the animal and interfere with feeding and rest. On post-mortem examination the cotton-thread-like worms are easily seen in the smaller branches of the windpipe and areas of the lungs may be solid. There is apparently no effective medicinal treatment to act on the worms and control must depend on regular changes of grazing areas, avoidance of damp places, and good nutrition. Calves should be drenched for stomach worm, as these may also be present

AVOIDING LOSSES IN CALVES

Young stock need good-quality, early-cut hay, particularly clover or lucerne hay, in which the leaf is still conserved. Poor hay is almost entirely lacking in the flesh-forming protein substances required by young, growing animals.

and actually may be more harmful than the lungworm.

Poor Feeding after Weaning

It will be evident that a good standard of feeding and proper management by rotational grazing will do much to prevent and control parasitic trouble. A low feeding level may, in itself, be the cause of loss. During the autumn and winter of 1948 in the drought-affected areas of the North Island many young stock were lost through actual starvation; there was no pasture and supplies of hay were insufficient. The defects in the food supply and its results were obvious.

However, a more insidious form of starvation may occur. Sometimes farmers state that ample hay has been fed, but the hay when examined is found to be no better than straw—dry, leafless, mainly inferior grasses cut at an over-ripe stage. Such fodder may provide a bare maintenance ration for mature bullocks or dry cows, but is almost entirely lacking in the flesh-forming protein substances required by a young growing animal, which has to build up body tissue. Young animals need good-quality, early-cut hay, particularly lucerne or clover hay, in which the leaf is still conserved. If hay is of inferior quality, an allowance of silage will serve to balance requirements.

What amounts to starvation may occur in young stock on lush autumn pasture, which, owing to its laxative effect, causes diarrhoea and passes through the gut too rapidly to allow of proper absorption of the digested portions. In such circumstances a ration of hay will be very beneficial.

Good pasture should provide the ideal balanced food, and correct management will ensure the proper adjusting of supplementary feeds to meet pasture fluctuations. Other valuable supplements are crushed grains, linseed, crushed maize, oats, etc., but these are expensive feeds and economic factors will decide to what extent they should be used, though even a small allowance will give results out of proportion to the cost. One of these expensive supplements could be fed with chaffed hay or oaten sheaf chaff in troughs to give better distribution. Much of what has been stated about feeding applies largely to North Island conditions, because in the north there is greater reliance on pasture and during most or all of the year grazing supplies a proportion of the feed. As the growing season is shorter in southern districts, greater reliance is placed on hand feeding throughout the winter period. Roots are used extensively in some areas, but roots are deficient in protein and also lack sufficient fibre to ensure proper chewing of the cud. Good-quality hay will make up for the deficiencies in roots, though if the hay is poor, silage or some grain feed must be used also.

Shelter

There has been a marked improvement in the provision of shelter on most of the good dairying country in the past 20 years, and it is shelter of the most suitable type—close-bottomed hedges or low plantations. Shelter, which conserves body heat and so reduces the amount of feed required, is highly important for young stock. On its sunny faces undulating land will provide excellent sheltered conditions.

Young pedigree stock, particularly bulls, are frequently housed. However, the additional labour that involves may hardly be justified in the case of less valuable stock, but in open exposed areas an open-fronted shed facing the sun to which yearlings have access will be used freely. Such a shed should be sited so that drainage is provided and muddy conditions avoided. Hay and straw stacks may be utilised in some cases to provide shelter.

Recommendations

To maintain young stock in good condition the following precautions should be taken:—

Grazing areas during autumn and early winter should be changed as frequently as possible, allowing a 3-weeks interval before returning to any pasture.

Where drenching is considered advisable the programme should start immediately autumn rains occur and not later than mid-March.

Food supply should be maintained at a level which will meet the protein requirement of the young animal.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during December and for the 5 months ended December 31, 1948, with comparative figures for the same month and 5-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

	Tons			Tons	
Period	Creamery	Whey	Total	Percentage inc. or dec.	Total in store at end of mth.
December, 1948	20,844	372	21,216	— 4.912	24,739
December, 1947	21,945	367	22,312	—	40,029
Increase or decrease	— 1,101	+ 5	— 1,096	—	— 15,290
For 5 mths. ended 31/12/48	80,890	1,378	82,268	+ 3.073	—
For 5 mths. ended 31/12/47	78,528	1,287	79,815	—	—
Increase or decrease	+ 2,362	+ 91	+ 2,453	—	—

CHEESE—

	Tons			Tons	
Period	White	Coloured	Total	Percentage inc. or dec.	Total in store at end of mth.
December, 1948	14,252	730	14,982	+ 2.308	23,630
December, 1947	14,644	—	14,644	—	22,855
Increase or decrease	— 392	+ 730	+ 338	—	+ 775
For 5 mths. ended 31/12/48	45,851	1,728	47,579	+ 9.351	—
For 5 mths. ended 31/12/47	43,510	—	43,510	—	—
Increase or decrease	+ 2,341	+ 1,728	+4,069	—	—

If these figures are converted into butterfat equivalent, there is an increase of 4.319 per cent. in butterfat graded for the 5 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which take place from time to time, they do not necessarily reflect actual trends of production on the farm.

THE HOME GARDEN IN MARCH

By A. G. KENNELLY, Vegetable Instructor,
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WORK in the home garden in March is largely a continuation of that done in February. It includes weed control, the sowing or planting of crops to mature before winter or to become established to the stage where full, rapid development can take place in early spring, composting, watering where necessary, and digging over and sowing vacant land with green crops.

SHALLOTS and onions can be harvested in March and stored in a cool, dry place. The pods of beans and peas should be gathered before they are fully mature so that the growth of the plants will not be checked. Vegetables such as cauliflower, broccoli, leeks, savoy cabbage, and silver beet intended for winter and spring use should be kept cultivated and where necessary fed with liquid manure to ensure that good growth is maintained. Main-crop potatoes can be harvested when they are mature. Earlier-sown crops such as lettuce, spinach, and silver beet can be thinned or seedlings planted out. The spraying of brassicas and celery and in most northern districts of potatoes and tomatoes should not be overlooked. The compost heap should be built up, and rubbish infested with insect pests or bearing the spores of long-lived diseases burnt.

Cabbage

The principal types of cabbage in New Zealand are (a) the smooth-leafed, pointed (oxheart or "spring") cabbage, (b) the smooth-leafed, globular (round or ballhead) and drumhead (round, flat-topped) cabbage, with which is included the red or pickling cabbage, and (c) the savoy (Milan or "winter"), crinkle-leafed cabbage. Other types are the Portugal cabbage, the collard or colewort (actually a kale), and the Chinese lettuce-cabbage, sometimes called celery-cabbage. The Chou De Burghley, a reputed cross between cabbage and cauliflower, is, like the Portugal cabbage, almost unknown in New Zealand.

Though cabbage is primarily a cool-weather vegetable, some varieties show considerable adaptation to fairly-hot conditions if there is adequate moisture. Cabbage grows best in a deep, rich, well-drained soil containing plenty of organic matter, though, like most other members of the brassica family (for example, kale, brussels sprouts, and broccoli), it succeeds on a great variety of soils, provided there is ample plant food and moisture and drainage is satisfactory. Cabbage has a very strong root system which when developed under favourable conditions may ramify in a profuse network to a distance laterally of more than 3ft. and to a depth of 5 to 6ft.; the roots recover well from injury during transplanting.

Because heavier soils retain moisture better and are likely to be richer in plant foods, they are usually preferred to the lighter ones, though light soils are often more suitable for early crops. Rotation of crops is important where cabbage is grown and heavy dressings of organic material such as compost, well-rotted stack bottom, and farmyard, stable, or poultry manure are desirable on most soils. When organic manures are not available a green crop should be dug in, and, except where the soil is very rich, the green crop or organic manure should be supplemented with a fertiliser at the rate of 2 to 5oz. per square yard. A complete fertiliser containing about 5 per cent. of nitrogen, 10 per cent. of phosphoric acid, and 5 per cent. of potash will in general give good results. Additional side dressings of nitrogenous manures such as nitrate of soda or sulphate of ammonia are often advisable, particularly where the organic matter applied to the soil is of a strawy nature rather than sappy or well rotted and when quick, forced growth is required, as in early spring.

Care should be taken not to apply too much nitrogenous manure in relation to phosphatic and potassic manure or the resulting soft growth will be easily damaged by such agencies as frost, insects, and secondary rots. Potash is of particular value for hardening and giving colour to winter-grown cabbage. Where a complete fertiliser is not applied additional phosphoric acid (best applied by a dressing of superphosphate) is advisable when applying

Heading photograph by Green and Hahn Ltd.

farmyard or stable manure, as such materials are low in that plant nutrient.

Though drainage, temperature, moisture, and manure placement are very important, the ultimate weight of the cabbage crop is greatly influenced by the amount of plant food available. Annual dressings of lime at the rate of 2 to 4oz. per square yard are advisable on most soils, though more may be necessary in high-rainfall districts. Cabbage is not especially sensitive to soil acidity, but it grows well in nearly-neutral or slightly-alkaline soil. Apart from correcting the pH value (degree of acidity) of the soil to maintain optimum growth, liming is important, as alkaline soils tend to inhibit the disease club root (their effectiveness in this respect varying according to the degree of their alkalinity). Though popular, the rotation of cabbage or cauliflower and potatoes should be avoided where the diseases club root and potato scab are troublesome, as liming inhibits the development of club root, but favours the development of scab; acid soils tend to inhibit scab, but favour club root.

Though under commercial conditions overseas cabbages are sometimes drilled direct to their final positions, in New Zealand they are practically always sown in a seed-bed and transplanted. Seed should be sown ¼in. deep in a finely-cultivated soil rich in well-rotted organic material that has been well incorporated in the soil. Sowing the seed in rows 12in. apart is preferable, as the plants are more difficult to weed and to a less extent to lift if sown broadcast. Regular spraying to combat aphides and caterpillars is usually necessary and in the more humid districts spraying to prevent mildew is also important.

Home gardeners often remove plants from the seed-bed and set them out when they are very small. This practice is advisable only if the garden is sheltered and conditions favourable. Plants should be sturdy, close-jointed, hardy, and well developed and should be lifted with a fibrous tuft of soil and roots. In the home garden, where there is usually no delay between lifting and setting out the plants, it should not be necessary to puddle the roots in thick, muddy water to keep them moist, as is often done under commercial conditions. When the plants are lifted the top growth can be dipped in a solution of arsenate of lead and nicotine sulphate if aphides and caterpillars are troublesome.

Planting should be done with a trowel, as the plants may not develop properly if the taproot is bent up, as often happens when planting with a dibble. If plants are watered in, the caked surface should be broken by hoeing or covered with dry soil or the value of the watering may be lost. If dry, plants in the seed-bed should be watered thoroughly the night before they are lifted.

Blind plants (those with no growing points) or very weak plants should be discarded, and if conditions are very hot and dry, about a third should be cut from the coarse, older leaf growth at the top of the plant. This reduces transpiration loss and enables the plant to establish itself better. Plants with bent or coarse, thick taproots usually develop better if about 1in. is cut from the root end. Rows should be 24 to 30in. apart and plants 18 to 24in. apart in the rows, according to size of variety, though cabbage grown for spring cutting is frequently planted closer in the rows (12 to 15in. apart) than their size warrants in anticipation of cutting them before full maturity. (In such circumstances the ideal would be to cut alternate plants first so that the remainder of the crop can develop fully, but this is rarely practicable unless growth is very even.)

The Smooth-leafed, Pointed or Oxheart Cabbage

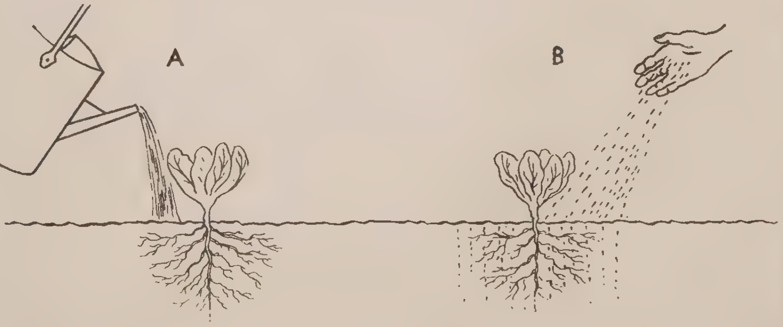
Because it is so hardy, relatively-quick maturing, and adaptable, the smooth-leafed, pointed or "spring" cabbage is a very popular and commonly-grown type of cabbage. Where climatic conditions (temperature and moisture) and cultural conditions are reasonably good it can be grown at any time of year, but the most important varieties are especially suited to autumn and, to a less extent, spring sowing for harvesting in spring or early summer. Varieties mature in about 16 to 18 weeks from sowing, but take very much longer if temperatures are very low or cultural conditions unfavourable. The first autumn sowing (for overwintering in the open) should be made in February, except in the milder northern districts, where a first sowing can be made in favourable situations in March.

Where considerable periods of low winter temperatures (40 degrees F. and down to freezing point) are experienced it is important that sowing is timed to produce a plant that is neither too large nor too small and for this reason February sowing is generally preferred in most districts. Where the autumn is long and very mild, particularly if it is moist, the resultant soft growth and large plants are liable to damage if winter conditions are severe, and premature seed development may occur in spring. Plants for setting out in late autumn should be sturdy and well developed with stems of about 3/16in. but not larger than ¼in. (about the size of a lead pencil). Plants noticeably smaller may be killed if subjected to prolonged low temperatures and severe winter weather.

Where winters are very mild the growing period may usually be reckoned as being fairly near the optimum period (16 to 18 weeks) required for most pointed varieties of cabbage to mature. A sunny situation, preferably with a northerly aspect, should be chosen for overwintering plants. The soil should be well drained, and though the plants should not be placed where they may be battered and loosened by boisterous weather, they should be grown on raised beds or even ridges if drainage is poor. Seedlings for setting out should be ready in about 6 to 8 weeks from sowing.

Some popular varieties: Flower of Spring, Jersey Wakefield, and Early Offenham are among the quickest maturing; Jersey Queen and Enfield Market are classed as second-earlies and mature about a fortnight later. Flower of Spring is the most adaptable and is very popular, particularly in southern districts. Good strains should be chosen.

Feeding Established Plants



It is not always convenient before sowing or planting, particularly with long-standing crops, to dig in all the nutrients required by plants. Frequently the reason for this is that heavy concentrations that suit mature plants may damage seed or seedlings, or alternatively the fertiliser ratios (that is, the relative proportions of the major elements—nitrogen, phosphoric acid, and potash) that suit young plants may not give the best results with mature plants because the plants' habit of growth may be changed from being purely vegetative to that of the production of seeds, fruits, or flowers (curds).

Where side dressings are necessary liquid manure (A) is usually very effective. If dry side dressings (B) are given, it is important that the nutrients are applied in such a way that they are available in suitable concentrations as quickly as possible to a maximum number of feeding rootlets. Lumpy, uneven spreading will tend to encourage uneven, less-efficient root development. In some areas the fine roots may be burnt; in others a thick mat may develop. If rainfall is low and the garden is not watered, fertiliser given as a side dressing may remain in the surface layer and either be largely wasted or tend to encourage comparatively shallow root development, a condition which should be avoided where the surface soil is likely to become very hot and dry.

[*Sparrow Industrial Pictures Ltd. photo.*

Savoy or winter cabbage is very hardy and is grown for late autumn and winter use, as it stands cold winter conditions well.

Smooth-leafed, Round Cabbages

Except in a few northern districts where the winters are mild, the smooth-leafed, globular (ballhead) and flat (drumhead) cabbages are not usually grown for harvesting during winter. Some varieties withstand a fair amount of frost if they are well developed and growth is not too soft, but because in general these smooth-leafed cabbages are not suited to prolonged low temperatures, plants are not usually set out until spring; they are grown mainly for late-spring, summer, and autumn harvesting. Plants for setting out as soon as growing conditions are favourable can be obtained by sowing in late autumn or winter in a warm, sheltered situation or in cool conditions under glass.

Maturity periods range from about 10 to about 16 weeks according to growing conditions and variety.

Popular varieties: Early: Golden Acre, Early Ball, and Early Market. **Second early:** Copenhagen Market (a round variety similar to Golden Acre, but a week or two later). **Mid-season (or slower-maturing types):** Succession and All Seasons (flattened or drumhead types). These are large cabbages grown mainly for late-summer or autumn harvesting, but they can also be harvested during the winter when conditions are not too severe.

Red or Pickling Cabbage

The colour of most popular "red" cabbages is nearly purple or reddish-purple. Most varieties are fairly slow maturing and should be sown in spring, though they can withstand a considerable amount of frost. They are useful for salads as well as for pickling.

Varieties: Mammoth Rock Red (large and late) and Red Dutch.

Savoy or Winter Cabbage

The savoy or winter cabbage is a very hardy type, varieties of which usually mature in from about 5 to 10 months. It is grown for late autumn and winter use, as it stands cold winter conditions well. Seed is usually sown in October or November, the important point (except where plants are required for autumn harvesting) being to time the sowing so that in districts where winter weather practically stops growth the plants are nearly mature at the onset of winter and will then stand according to their maturity periods. Late varieties can be grown to be available in most districts until early September. Plants are usually set out in December or January, though in districts where late-autumn and winter conditions are not severe plants can be set out in February. Where late-maturing varieties are set out late and are not severely checked by winter frost they may continue to develop (if not full grown) for a time in spring.

Popular varieties: Savoy: Early Ulm, Ormskirk Early, and Early Drumhead. **Mid-season:** Christmas Drumhead and Ormskirk Medium. **Late:** Late Drumhead and Latest of All. **Very late:** Ormskirk Extra Late and Omega.

Carrots

In northern districts where conditions during the winter are favourable an early sowing of carrots for harvesting in early spring can be made. A warm, well-drained soil in a sunny situation should be chosen and a raised bed is usually an advantage. Autumn-sown carrots are rarely successful where winter conditions check growth severely, and it is therefore not advisable to sow in districts where heavy frosts or considerable periods of very low temperatures are experienced.

The actual time seed should be sown varies somewhat according to district. A sowing made before the end of March is usually satisfactory, though later sowings may be made in favourable situations in districts where winter conditions are very mild. Where frosts of more than a few degrees are experienced it is desirable to have the plants well enough established to prevent their being lifted by frost, but not so large that prolonged low temperatures will so check them that they run to seed with the advent of the better weather of spring.

Carrots succeed best in deep, rich, well-cultivated soils, but care should be taken when building up the humus content to apply only well-rotted material in limited quantity so that when incorporated it forms a homogeneous mass with the soil; otherwise misshapen or forked roots may result. For this reason, too, the soil for carrots should be well cultivated and if possible free from stones or lumpiness, because if the young taproot encounters a stone, a mass of fertiliser, or a very wet or very dry layer, its normal development is likely to be aborted.

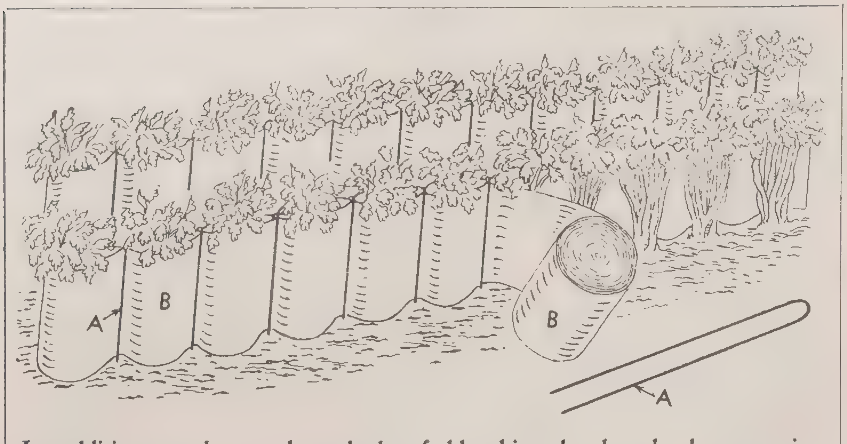
Where the soil is reasonably well supplied with organic matter carrots respond well to moderate dressings of artificial manure. Though it is not possible to give a formula for a manurial dressing that will give optimum results on all soils, a complete fertiliser high in phosphoric acid and relatively low in both nitrogen and potash is likely to give good results on a wide range of soils. Such a fertiliser could be made up, for instance, by mixing (by weight) 2 parts of sulphate of ammonia, 8 parts of superphosphate, and 1 part of muriate or sulphate of potash. On most soils such a dressing should be applied at the rate of about 2 to 3oz. per square yard.

Short or half-long, quick-maturing types of carrot are preferred for autumn sowing. Good varieties are Guerande, Scarlet Horn, Chantenay, and Market Garden.

Cauliflowers

The cauliflower (*Brassica oleracea botrytis cauliflora*) is more sensitive to adverse conditions than either cabbage or broccoli. It can be grown on almost any well-drained soil, provided it is well supplied with plant food and moisture. Soil should be deeply cultivated and rich in well-rotted organic manure supplemented by a complete fertiliser applied at the rate of 2 to 5oz. per square yard and well incorporated throughout. A green crop should be dug in where organic material is lacking. Cauliflowers must be permitted to grow continuously or the curd or flower will not develop properly. Most soils should be limed annually at the rate of about 2 to 4oz. per square yard some time before planting. More may be necessary in high-rainfall areas.

Cauliflowers are not tolerant of sour or acid soil, and liming is necessary on most soils; liming is also a good precaution against the disease club root, which is prevented from developing if the soil is sufficiently alkaline. As the cauliflower must never be checked and the curd is liable to frost damage, seed sowing must be arranged to suit the climate. Plants should not be overwintered in the field when the weather is cold enough to check growth severely, and they cannot be grown successfully where conditions are excessively dry, as is the case in some districts in late summer or autumn.



In addition to the usual methods of blanching by boards, by wrapping individual plants, or by earthing them up, celery can be blanched by using a roll of reinforced paper. Wire spanners (A) straddle the rows and are set in the ground deep enough to hold the paper (B). If good-quality paper is used and stored carefully, it will last for many years. This method is suited to both the self-blanching and the older types of celery.

Except in mild climates, plants for setting out in early spring should be raised in autumn or winter either under glass or in very sheltered situations. Successional sowings can be made in spring in the open as soon as the ground is in condition and can be continued where the soil does not dry out until about midsummer, when only varieties which are self-protecting or which will mature before there is likelihood of severe frost should be sown. Later sowings can be made in districts where the autumn is mild enough to enable the plants to develop fully without the curds being damaged by frost. Where frost is expected it is advisable, however, to protect the curds by tying the leaves of open varieties together at the top as they near maturity.

The seed-bed for cauliflowers should be well drained and worked to a very fine tilth. Seed should be sown ¼in. deep, preferably in rows, as the soil is easier to cultivate and the seedlings are usually easier to lift than when seed is broadcast. In humid districts Bordeaux spray at 10- to 14-day intervals is usually necessary to combat mildew.

To obtain continuity quick-maturing varieties can be sown at intervals of about a month or several varieties with different maturity periods can be sown about the same time or at short intervals, though in districts where winters are mild and broccoli are not grown autumn sowing is necessary to obtain cauliflower in winter and spring.

Seedling plants for setting out should be lifted carefully with a good ball of soil attached. Blind plants, weak, spindly plants, and those with a characteristic bluish tint, which usually signifies the development of only miniature curds, should be destroyed. Seedlings should be dipped in a solution of arsenate of lead and nicotine sulphate when transplanting if aphides or caterpillars are troublesome. Seedling plants should be watered, left overnight, and then lifted carefully, and in hot, dry weather a third can be cut off the ends of the main leaves to reduce transpiration. Plants should be set out 18 to 24in. apart in rows 2 to 2ft. 6in. apart, the actual distance being determined by the size of the variety.

Varieties: All Seasons, Walcheren (semi-protecting), Early London, and Early Snowball (3 to 4 months), Phenomenal Early (4 to 5 months), Phenomenal (5 months), Veitch's Autumn Giant (6 months), Phenomenal Main Crop (6 to 7 months), Late Metropole (6 to 7 months).

Celery

Celery is a biennial and belongs to the same family as parsley, carrot, and parsnip. Its nutritive value is not high; it is relatively low in vitamins and has little protein and carbohydrate content, but it is a fairly-good source of calcium and contains some iron. It is chiefly valued for its distinctive flavour and for its texture, and though it is an exacting crop to grow, its popularity is such that it should be grown more often by home gardeners who appreciate it and who can provide suitable conditions for its development.

In most home gardens the main crop of the golden self-blanching type of celery will now be nearly mature. Few home gardeners now grow the green (white if blanched) type of celery, as most types of it are much more difficult to blanch than strains of the golden type. In general the green celery is hardier; it has a more robust constitution and the texture and flavour of good varieties is superior. If eaten green, its vitamin content is much higher. Red strains of the green celery are particularly hardy. In America in recent years there has been a renewed appreciation of green celery and its production there is increasing.

The qualities desired in a good variety of celery are large, thick-fleshed petioles or leaf stalks, vigorous growth, a full heart made up of many leaf stalks, sweet, nutty, characteristic celery flavour, tender, stringless, succulent growth, and, usually, ease of blanching. Ease of blanching is, however, a characteristic that is relative to type; that is, some varieties of each type blanch more readily than others.

Few varieties other than self-blanching are now listed in most New Zealand seed catalogues, though formerly celery was listed as green, white and pink, or red. Strains sold as green and occasionally as red or pink celery were sometimes grown for their leaves as well as their stalks, the leaves being cut somewhat like parsley and used for soups and stews. The stalks of these strains were numerous and usually rather thin, but were plentiful and produced continuously over a long period. This type of celery is not grown now, but most catalogues still list fine-quality, white, pink, or red varieties. These are usually included in the group known as green (white when blanched) celery.

With the exception of certain of the newer strains such as Cornell 6, 9, or 19, Golden Pascal, and Masterpiece, most of which are intermediate to the self-blanching and the green types and which are not often listed in New Zealand seed catalogues, the best strains of green celery are much superior in flavour and texture to the popular self-blanching, yellow types commonly grown in New Zealand.

The many different strains of celery are grouped and described below.

Golden or Summer Celery

The type mainly grown in New Zealand, golden or summer celery is easily blanched, matures quickly, and is light green to yellow-green. There are two distinct types: Golden self-blanching and golden plume.

Golden self-blanching is one of the most popular varieties of celery grown in New Zealand. It was formerly a single variety and originated from a rogue found in a crop of Giant Pascal, but many varieties of the type have now been developed. It grows about 18 to 24in. high and has yellowish-green leaves, medium-sized hearts, and a stalk length of about 9 to 11in. to the first branches. It owes its popularity mainly to ease of blanching and to its fine appearance when blanched, but it is otherwise only of fair quality. The stalks are rather stringy and much less succulent than those of the green types. As with other types of celery, many of the names of strains are mere synonyms, but good examples of the type are: Florida Golden and Tall Golden Self-Blanching (tall); Supreme Golden (intermediate); and Golden Self-blanching Dwarf and Golden (dwarf).

The golden plume type rivals the golden self-blanching type in popularity. Strains of it are not as tall as the taller strain of the golden self-blanching, though they are usually more vigorous and capable of developing heavier hearts in a shorter time. Quality is only fair, but they blanch easily and are to some extent more resistant of leaf blight (*Septoria apii*) than golden self-blanching strains. Strains of the type are: Golden Plume and Golden Phenomenal (tall); Golden Prize (intermediate); and White Plume and Non-bolting Golden Plume (dwarf).

None of the foregoing types of celery keeps very well after harvesting and the golden self-blanching types in particular tend to wilt shortly after cutting if grown quickly. This is particularly noticeable in much of the marketed celery, as the tendency of the hearts of the self-blanching types to grow up very quickly after blanching has commenced is often accentuated by the practice of applying quick-acting nitrogenous fertilisers such as nitrate of soda or sulphate of ammonia when putting the boards or other blanching material in place.

Green, Late, or Winter Celery

Green, late, or winter celery takes longer to mature than the golden or summer type, but it is heavier, of better quality, and can be stored longer. Varieties of it are rarely grown commercially in New Zealand. There are two main types: Dark-green and easy-blanching.

The dark-green types are usually about 17 to 20in. tall, the first branches being about 6 to 8in. up the stems. They are of excellent quality. The foliage is dark green and they have medium to good hearts. The leaf stalks are round, thick and fleshy, smooth ribbed, tender, not stringy, and green. They blanch slowly, and in America, where they are very popular, they are usually sold either green or only partly blanched. This type of celery deserves to be grown more in New Zeland, as apart from its superior quality, when it is not blanched it is richer in vitamins than most other types of celery.

Examples are: Fordhook, Utah, syn. Salt Lake (a heavy-hearting type), Giant Pascal (a good variety with poorer hearts), Summer Pascal (easily blanched, but with small hearts), and Solid White (slow to blanch, but of good quality).

The easy-blanching type has very green, glossy leaves, and is shorter and slower to blanch than the golden self-blanching type, but is more vigorous and a better keeper. Though classified as a green celery, it blanches easily, and has numerous thick, rather brittle stalks of good quality. Examples of the type are Crispheart and Easy Blanching.

Intermediate Class

Intermediate types of celery are very fine and have stalks much like the round, thick, meaty kind of the green type and much of the fine table quality of the green, but have the colour of the golden or self-blanching type. The stems have fairly smooth ribbing and less stringiness than the golden varieties, but are not quite as easy to blanch. Examples are: Cornell 6, Cornell 19 (the former has shorter but heavier leaf stalks and a fuller heart than the latter), and Masterpiece (a full-hearted strain).

Red or Pink Celery

The outer leaf stalks and to some extent the margins of the inner stalks of red or pink celery are red, pink, or purplish. Apart from this, the petioles are cream or white. The flavour of good varieties is very fine, nut-like, and distinctive. Good varieties are London Prize, Leicester Red, and Market Pink.

Culture

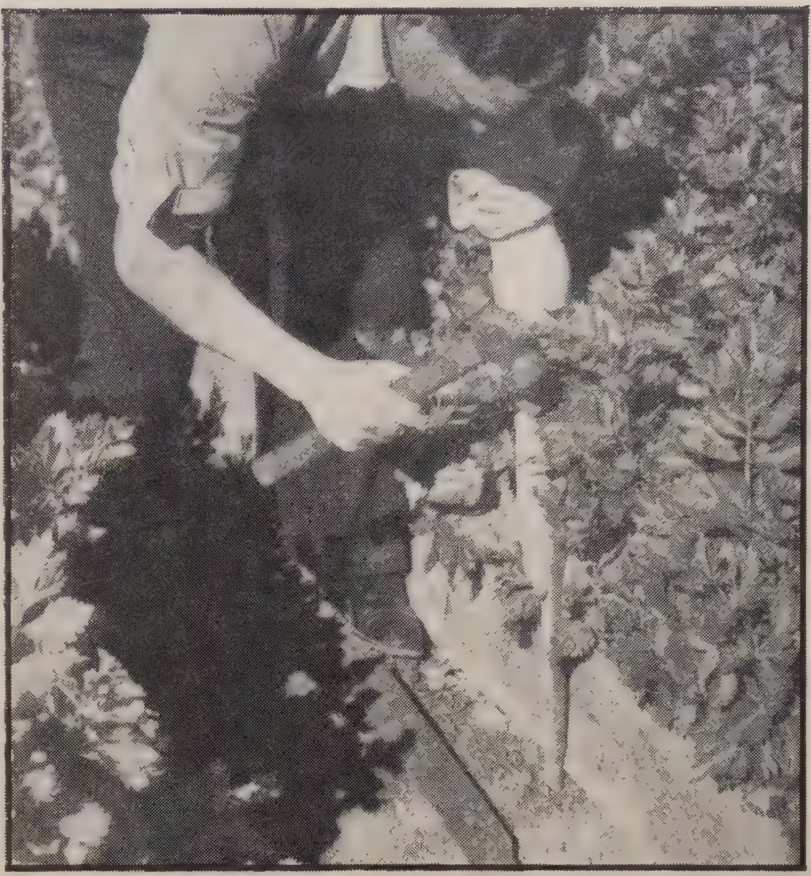
Because the roots of celery, though fibrous and mat-like, have a limited spread both laterally and vertically, the supply of moisture should be carefully regulated. A liberal and unfailing supply of moisture is essential for quality produce, though the soil should be well drained. Manuring and cultivation are also very important. Heavy applications of manure are usual on most soils. Organic manure such as farmyard or fowl manure or artificial organic manure such as blood and bone is preferred and where organic manures are not available in sufficient quantity it is usual to supplement them with the three major elements (nitrogen, phosphorus, and potassium). Organic manures are preferred on most soils because of their beneficial physical effect on the soil and because in general they also supply important minor elements, the deficiency of one of which, boron, is not an uncommon feature of celery culture. If growth is slow, side dressings of a nitrogenous fertiliser such as sulphate of ammonia or nitrate of soda should be applied.

Because of the limited size of its root system celery suffers more than most crops if weeds are allowed to compete with it. Weed control should therefore be rigorous.

Soils not limed for a considerable time usually benefit from a dressing of about 3 to 4oz. of lime per square yard, though more may be necessary on high-rainfall areas. As most research workers consider a neutral to slightly-acid soil is best, care should be taken not to apply too much lime.

Though plants can be set out earlier where the ground has warmed sufficiently, December and January are the most favoured months for planting out. Good crops of self-blanching celery can be produced from February or occasionally even later plantings in favoured districts where autumn and early-winter conditions are sufficiently mild.

The seedlings should be thoroughly watered before lifting for setting out in prepared beds or trenches. Celery has a low, disc-like stem or basal crown and should be set correctly when it is planted out, because if it is planted too shallowly, the roots will be exposed and the plant may not stand up; on the other hand if it is planted too deeply, soil may get into the heart and cause it to rot. Plants should be set with a trowel when about 4 to 6in. high, though in light soils a dibble can be used. The self-blanching types of celery are usually set out in beds. Trenches are sometimes used, particularly with the older



[*Green and Hahn Ltd. photo.*

The golden self-blanching type of celery blanches very easily and one of the simplest methods of blanching it is to place 10 or 12in. wide planks on their edges around the sides of the bed. The planks can be held in place by pegs.

type of celery, or if celery is to be irrigated or banked with earth.

Beds are usually planted in rows 4 to 6 wide, with the plants set out 8 to 12in. apart each way according to size. In trenches a double row is usual.

Most self-blanching varieties can be blanched in from about 10 to 21 days, but with the green varieties blanching may take from about 14 to about 40 days according to variety and the method adopted; that is, the extent of blanching desired and whether or not it is done in stages. Blanching improves the rather acrid flavour that some varieties of celery have when immature and is caused by either the failure of the chlorophyl (green colouring matter) to develop or more usually by its disappearance after it has been formed, particularly with green varieties of celery. Its disappearance is more correctly a process known as etiolation, as the pale yellow coloration of plants grown in the absence of light is caused by the deposit in the plant's cells of a substance called etiolin, which is a yellow pigment and is the first form of chlorophyl.

Self-blanching celery is usually blanched by placing 10in. or 12in. x 1in. boards, held in place by pegs, around the sides of the bed. Suitably-stiffened paper such as that used by builders (for example, laminated paper tarred on the inside and strengthened by fibre) can be used if desired in place of the boards. The older (green or white) type of celery can be blanched similarly, but as a much longer period is required for blanching, it is usually either wrapped individually with stout paper held with string or elastic bands or earthed up in fine weather with clean, free-working, reasonably-dry soil which preferably contains little organic matter and is free from the eggs of slugs or similar harmful creatures. Small or decaying outer stems should first be removed.

When finished the banked earth should be ridge shaped and the soil surface beaten smooth with a spade to shed rain. Under wet conditions rots are liable to develop if soil remains touching the inner stalks after earthing up is completed and the stems should therefore be drawn together when the soil is packed around them.

Though it is sometimes claimed that the quality of celery blanched with earth is superior to that of celery blanched by boards or paper, blanching with paper is quite satisfactory. A long strip of reinforced (laminated) paper should be placed along the sides of the bed and clipped in position with arched 10 or 12 gauge wires as shown in the illustration on page 140. Rots often develop in soil-blanched celery in hot weather and blanching with soil is therefore most satisfactory in cool districts or in late autumn. As blanching causes a reduction in chlorophyl, it tends to check growth and should not therefore be commenced until the plants are nearly ready for harvesting. If, however, a good head of leaves is left at the top, and if, where soil is used for blanching, it is not too tightly packed, the plant will continue growing, though as self-blanching varieties contain very little chlorophyl in their leaf stems or petioles and blanch very quickly, and blanching with soil is rarely practised with them, the operation of blanching has little effect on their growth. The exclusion of light tends to make the leaf stalks more crisp and lengthens growth of the heart, which at the same time usually enlarges to some extent. Care should therefore be taken when earthing up with soil to avoid getting lumps into the centres, where damage may be caused to the developing heart.

A succession can be obtained by planting early and late varieties, but it is more usual to make two or three plantings or where a considerable number of plants are grown to start blanching early and blanch only a limited number at a time. The practice of blanching over a very long period is, however, more suited to the green type; it has only a limited application to self-blanching celery, as few varieties of self-blanching celery keep well and some, for example, Golden Plume and Early Fortune, quickly become pithy and over-ripe if held too long.

Pithiness is a common fault of celery and is caused by the breakdown of the parenchyma cells (the thin-walled cells that make up the substance of the leaf stem, as distinct from its outside and connective tissue) and may be the result of conditions of environment or it may be inherent in the variety. Pithiness resulting from conditions of growth is responsible for a great deal of loss in both commercial and home-grown celery. Though there is also a varietal susceptibility, pithiness caused by growing conditions can be distinguished from inherent pithiness by the fact that pithiness caused by growing conditions is mainly found in the outer leaf stalks and increases as the plants mature.

Home gardeners who have a large planting of one variety of celery and who intend to harvest it over a long period can commence blanching when the plants are about half to two-thirds grown. Plants are best harvested without delay after removing the blanching material. The fibrous roots should be cut with a sharp knife or spade just below the disc-like stem or crown, which should afterwards be trimmed with a sharp knife. Poor-quality, coarse or pithy outer leaf stems should then be removed. With most self-blanching varieties it is necessary to remove all the outer leaves, but if a first-class variety is well grown and is harvested at the right time, few outer leaves need be discarded.

Globe Artichokes

The Globe artichoke is somewhat of a novelty in New Zealand gardens. It is a perennial, not unlike a large thistle, and is also known as the French or burr artichoke. The scales of the huge, immature flower buds are the edible portion, and though the taste is an acquired one, the vegetable is highly prized by connoisseurs. Artichokes should be liberally supplied with water during the growing season and the heads should be cut and used as they develop. Buds may be prepared for the table in a number of ways; the small side buds may be eaten raw or fried, but the main bud is usually boiled and the inner leaves and the fleshy part of the outer leaves eaten like asparagus.

Artichokes grown from seed of an unknown stock are sometimes disappointing, but if a good stock is obtained it can be perpetuated from suckers. A plantation of artichokes may last up to 5 years in rich soil, but on the poorer soils results are likely to be disappointing after 2 years. Each year after establishment the plants should have all but about four of the strongest suckers removed, and to obtain big flower heads lateral buds surrounding the main head should be removed when about the size of a hen's egg.

Artichokes are hardy on well-drained soils, but in districts where winters are severe they should be lightly earthed up during prolonged cold and wet periods. There are several varieties and it is desirable to grow only the best. Seed of the common popular globe variety (*Cynara scolymus*) is sold by most seedsmen.

Mustard and Cress

Mustard and cress deserve to be grown more generally in home gardens where good salad is appreciated, as both are easy to grow and quick to mature. Cress should be sown frequently and somewhat more thickly than mustard, though not too much so. Either curled- or plain-leaf types of cress can be grown, as the plant is cut in the seed-leaf stage when about 2in. high and when it is short, plump, green, and tender.

Cress is a little slower in growth than mustard and should be sown a little in advance of it. Though both can be sown in the open border, for best results a pot or box filled with material such as bulb fibre should be used, as plants grown from seed sown in soil are often gritty. If soil is used, the seed is best simply pressed firmly on it with a block of wood.

After sowing, the box should be thoroughly watered and then covered. An inverted box is excellent for the purpose, and in a few days growth should be sufficient for the cress to be brought into the light so that the leaves and to some extent the stems turn green. If the boxes of plants require watering, they are best plunged in a large container so that the water soaks up through the bottom; if watered with a can, the soil usually splashes on to the stems and is often difficult to remove when preparing the plants for the table. Cutting can be done with scissors.

Mustard is used in the seed-leaf stage like cress; white mustard should be chosen, as the brown is usually rather bitter. Frequent sowings must be made, and though seed may be sown on an open border during most of the growing season, a shady situation is necessary when conditions are hot and dry. Black rape is sometimes grown instead of mustard, as its culture is easier, but mustard has a superior flavour and grows more quickly.

Onions and Shallots

If the work has not yet been commenced, the harvesting of onions and shallots should be proceeded with as advised in last month's "Journal." The keeping quality of the bulbs is greatly influenced by the care taken in harvesting and storing. Storage conditions are best where the relative humidity is low (about 63 per cent.) and the temperature is steady at or just above freezing point, but the home gardener usually gets quite good results from storing the properly-dried bulbs on slatted shelves or in slatted bins in a dry shed which has a comparatively-sunless aspect. Diseased, thick-necked, or improperly-matured onions should be rejected for storage.

Onions are very popular and have a very wide range of uses, but they are not very high in vitamin value. Apart from their long season of availability and the comparative ease of their culture, they owe their popularity largely to their strong, pungent flavour, which is, however, the chief reason why many people find them objectionable. Degree of pungency is a varietal characteristic and is caused by the varying amount of a sulphur-bearing compound that is present in very minute quantities in the volatile oil of the plant juice. Some varieties contain more than twice as much as others. The strong flavour can be reduced to some extent by suitable methods of cooking. Varieties such as White Lisbon or Odourless are very mild and are popular with those who dislike the strong pungency that characterises most varieties of onions.

Successional Sowings

The number of subjects that can be sown now in most districts with prospects of their maturing before winter is comparatively small. Quick-maturing varieties of spinach, radish, turnip, and beetroot can be sown, but even with these vegetables success in most districts depends largely on factors such as weather, situation, and favourable cultural treatment. Soil for all the above subjects should be well drained and rich in plant nutrients and humus. Quick growth is essential if good quality is desired. The soil should be deeply dug and cultivated to a fine tilth. Soil lacking humus can be improved by the thorough incorporation of compost or well-rotted farmyard or stable manure.

Seed can be sown ½in. deep in rows 12 to 15in. apart. The ordinary type of radish can, however, be sown ¼in. deep in rows 6 to 9in. apart or broadcast in prepared beds, which for convenience of gathering should not be more than about 3ft. wide.

Home gardeners who are fond of radish are advised to make a sowing of the Chinese (Celestial) radish, which is a distinct type and is much larger than the ordinary types of radish. When well grown the flesh is firm, crisp, and succulent and the flavour compares favourably with that of the smaller radishes.

Recommended varieties are: Chinese Rose Winter (Scarlet China), which has roots about 5 to 7in. long and is about 1¾ to 2in. in diameter at the shoulder, but is slightly broadened at the blunt lower end. It is smooth, bright rose-red, with white, firm, crisp, pungent flesh. Chinese White has large, smooth, white roots about 8in. long and about 2½ to 3in. in diameter, and is cylindrical, with a heavy shoulder and blunt bottom. The flesh is rather mild, crisp, white, and firm.

Another very good winter variety of radish is Round Black Spanish. It is a good keeper, with globular roots and slender, well-defined taproots, and is 3 to 4in. in diameter. The skin is black and somewhat roughened with cracked, longitudinal lines. The flesh is white, firm, crisp, and pungent.

[*Green and Hahn Ltd. photo.*

The seed of plants such as silver beet, lettuce, cabbage, or cauliflower can be sown now to mature in spring, but in colder districts a warm, sheltered, well-drained situation should be chosen.

All the foregoing varieties of radishes reach usable size in about 50 to 55 days, but where conditions are favourable they continue to grow and remain in condition for a long time.

A good variety of turnip for sowing now where conditions of growth are favourable is Milan. It is a quick-maturing variety with a small, compact top. The roots are mild and sweet with white, fine-grained flesh. There are several strains of it, such as Purple Top Milan and White Milan. They mature under good conditions in about 42 days from sowing.

Only quick-maturing varieties of beetroot should be sown now in most districts, as slow-maturing varieties are likely to be checked before they are large enough for use. Good quick-maturing varieties are: Extra Early Flat Egyptian and Early Wonder. Detroit Dark Red is a little slower in maturing, but it retains its fine quality until completely mature.

One of the best varieties of spinach for sowing now is Giant Long Standing Prickly. It should yield well into the winter.

Plants such as lettuce, silver beet, and cabbage or cauliflower can also be sown to mature in spring, but in the colder districts a warm, sheltered, well-drained situation should be chosen.

Sweet Corn

In the warmer districts where successional sowings of sweet corn have been made the plants should be kept free from weeds. Cultivation must, however, be shallow after the plants have begun to grow, because the roots extend throughout the ground and some of them are quite near the surface. Sweet corn is fairly tolerant of dry conditions, but in a hot, dry season the plants will mature a week or two earlier if they are watered occasionally.

It used to be common practice for home gardeners to "hill" their corn, but it is now generally agreed that there is little justification for the practice, as the raised soil surface about the corn tends to shed rain and makes watering difficult. Earthing up the stems of tall varieties is justified where winds are boisterous and the plants are not firmly established. It is a good plan, however, to grow corn in the sort of "hills" that are actually clumps, as corn is wind pollinated and pollen distribution is best where the plants stand in squares or blocks.

A special advantage of the newer strains of corn is that they can be planted in rows and comparatively little space is required, but planting too close should be avoided and it is not advisable to plant in one long row. To ensure pollination there should be at least two rows, though several short rows are preferable. Occasionally home gardeners find that an ear of a yellow variety contains some white grains. This may happen when white and yellow varieties are planted close together. It is disappointing to the enthusiast who takes a pride in the appearance of his sweet corn, but is not harmful otherwise unless seed is saved.

Quality depends greatly on harvesting sweet corn at the correct time. Home gardeners rarely grow enough of it to learn to tell the correct stage for harvesting without examining it closely, but it is possible to become sufficiently expert to know just by the appearance and feel of the ear. No rule can be laid down, as varieties differ. The inexperienced home gardener can best judge maturity by thumbnail pressure. The young grains are first watery inside, then milky, then doughy, and, finally, the dent stage is reached when the grains are too hard to be palatable. The cob should be harvested with a gentle jerk or cut with a sharp knife when the milky content of the grain is beginning to thicken but is still milky. This is usually just about the time the silk is turning black.

Only home gardeners who grow and harvest their own sweet corn can know it at its best and they have a great advantage over people who obtain supplies from shops, because at a temperature of about 80 degrees F. sweet corn loses half its sugar content within 24 hours of being picked. In the home garden, therefore, if best quality is desired, corn should be used immediately it reaches the correct stage of ripening. If storage is necessary, a cool place is desirable. The corn remains in best condition only if it is cooled to 45 degrees F. or lower and kept at that temperature. Where quality of stored corn is desired the importance of immediate, rapid cooling to this or lower temperatures cannot be over-emphasised.

Many people merely boil sweet corn, but those who have not tried steaming it have a new experience awaiting them. Steaming takes about twice as much time and therefore more fuel than boiling, but as only about 20 minutes are required over a good fire, the extra fuel is not important in comparison to the improved quality of the cob. Results are usually better, too, if the cob is steamed or boiled with the husk on.

Sweet corn is quite rich in vitamins. The yellow varieties are a good source of vitamins A, B_1, and B_2 and contain some vitamin C, and the white varieties contain some vitamin A and are a good source of vitamins B_1 and C.

Liquid Manure

[*Sparrow Industrial Pictures Ltd. photo.*

Liquid manure is a complete plant food and can be made by suspending a small sack or sugar bag of farmyard manure in a large container of water for a week.

Liquid manure is a complete plant food, and gardens where organic manure is in short supply will benefit especially from its use. A good-sized container such as a 40-gallon drum or large open cask filled with liquid manure is an advantage in most home gardens. The liquid is easily made by filling a small sack or sugar bag with fresh manure (preferably pig, sheep, or poultry manure) and submerging it for a week in a large container of water. The solution should be used at the rate of 1 part to 3 parts of water. If the container is then refilled with fresh water, the solution, diluted with equal parts of water, may be used at the end of a week. Thereafter each refilling should be allowed to stand for about a week before it is used. It should be applied weekly at the rate of 4 gallons to about 18ft. of row to strong-growing plants when growing conditions are good. The bag containing the manure should be pressed from time to time to ensure more complete dilution of organic material in the water.

Though liquid manure is a relatively-safe plant food, it should not be applied indiscriminately. The following points should be observed when applying it:—

1. It should be weak when applied to seedlings and newly-planted or slow-growing subjects.

2. It can be used at full strength on very strong growers such as cabbage, rhubarb, silver beet, kale, marrow, and pumpkin during the period of rapid development or when growth is nearly complete.

3. It should be applied according to light and temperature. Weaker solutions and less frequent applications are advisable in early spring and late autumn. Only if the soil lacks plant food and when growing conditions otherwise (temperature, sunshine, and drainage) are favourable to the crop should it be applied in winter.

4. Dry soil should be watered before applying it, and it should then be applied generously and the soil containing the bulk of the roots soaked.

5. It should be applied according to response; that is, applications should not be repeated unless growth indicates the need. (Where applications have been too liberal yellowing of the foliage is often a sign that the plant is, paradoxically, suffering starvation because of the presence of too-high concentrations of soluble plant food.)

6. It is preferable to feed repeatedly with very weak solutions than to water alternately with plain water.

Penetration of the liquid manure can usually be facilitated by breaking the surface of the soil by hoeing it or by "pricking" it over with a fork. In addition, if required, deep holes can be made with the tines of a fork or with a crowbar.

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RADIO BROADCASTS

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

March 16—"Land Improvement," by P. W. Smallfield, Director of the Extension Division, Department of Agriculture, Wellington.

March 23—Young Farmers' Clubs session, by D. G. McLachlan, Dominion president.

March 30—"Culling and Selecting Poultry Breeding Stock," by H. A. Kitto, Poultry Instructor, Department of Agriculture, Auckland.

All 7.15 p.m. talks from 1YA are now to be given on Wednesdays instead of Mondays as previously.

A special series of talks recorded by the B.B.C. will be given from Station 2YA Wellington at 12.35 p.m. on the following dates:—

March 3—"Husbandry," by Professor J. A. Scott Watson, Chief Scientific Adviser to the Ministry of Agriculture.

March 10—"Soils and Crops," Sir E. John Russell, formerly director of the Rothamsted Experimental Station.

March 17—"Animal Production," Dr. J. Hammond.

March 24—"Dairy Science," Dr. H. D. Kay, Director of the National Institute for Research in Dairying, Reading.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m. and 3YA Christchurch on Mondays at 12.20 p.m.

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JOURNAL OF THE BRITISH GRASSLAND SOCIETY
(Editor: Dr. H. I. Moore)

This Journal is the medium through which British workers on grassland and related problems give the results of their experiments and their views and experiences on questions of current interest. It is designed to supply information of value and interest both to technical specialists and the practical farmer.

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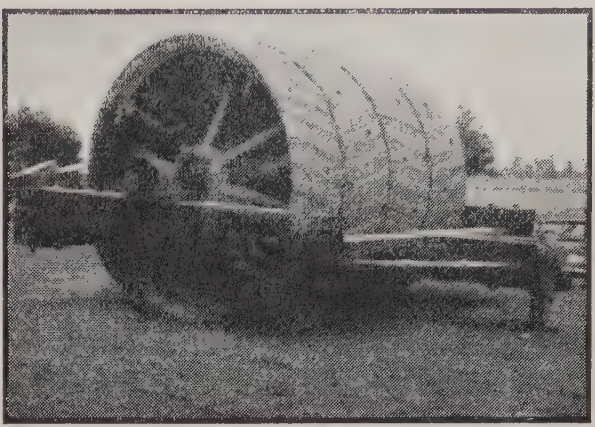
Use of Heavy Roller In Canterbury

By G. K. McPHERSON, Instructor in Agriculture,
Department of Agriculture, Ashburton.

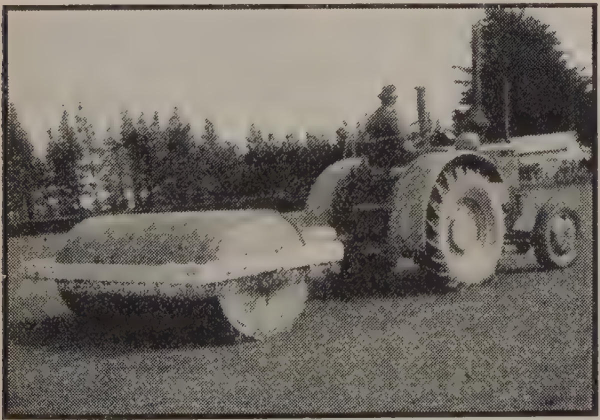
THE method of constructing the first heavy concrete roller made in Mid-Canterbury for agricultural purposes was described in the February, 1946, issue of the "Journal," and possible advantages and disadvantages of the roller were discussed. However, as at that time practical experience of the heavy roller was very limited, it was only natural that certain details concerning its use on the stony land of Canterbury were based largely on conjecture. It is now possible to summarise the experiences of some of the farmers who have used the heavy type of roller for the last 2 or 3 years. This article deals specifically with the agricultural aspect of heavy rolling and does not include engineering details associated with the construction of the various types of rollers.



A heavy roller made from 4 traction engine wheels. The roller is 6ft. wide and with the frame weighs about 6 tons.

ON many aspects of farming farmers' opinions naturally vary quite considerably, while circumstances frequently force farmers to improvise. These two factors no doubt explain to some extent at least the reasons for the varying types of heavy rollers to be seen in use today. The type of work for which rollers are required has also affected the design and the method of construction of heavy rollers. On the heavier types of land in Canterbury the stones generally are relatively small and usually not very numerous, and paddocks are comparatively small. Rollers for this class of country are frequently made about 6ft. wide and would weigh 4 to 6 tons. Much of the lighter land of Canterbury is thickly covered with stones, some of considerable size, and paddocks of 40, 50, and 60 acres are quite common. On this class of country the width of the roller is an important factor, and because the stones are bigger additional weight is desirable. Many of the rollers used on this lighter land are therefore 8 to 9ft. wide and weigh 7 to 10 tons.

The original roller made by Mr. E. H. Davis, of Ealing, Mid-Canterbury, consisted of eight 12in. 10/20 McCormick-Deering tractor wheels (42in. diameter) welded together in pairs, suitably reinforced, and filled with concrete. This roller was estimated to weigh 7 tons. No doubt because old tractor wheels were available for a time, most of the heavy rollers now in use are adaptations of this type. In some cases bigger tractor wheels and even traction engine wheels (54in. diameter) have been used. In other cases a reduction in the number of wheels from 8 or 9 to 6 or 7 has been made. Again, some rollers have been constructed with the wheels partially filled with concrete, while in others the concrete has been replaced with movable weights attached to the frame of the roller.



Burying the odd stone in a paddock which it is intended to harvest for white clover seed. This roller is 8ft. wide, 3ft. 6in. high, and is estimated to weigh 6 tons.

Another type of heavy roller of which there are several in Mid-Canterbury is constructed with traction engine wheels—usually 4—which make the roller approximately 6ft. wide and, without concrete, about 6 tons in weight.

There is a third type known as an articulated roller, which is constructed in three sections all having separate axles and frames. The sections usually consist of boiler casing filled with concrete. The leading unit is attached directly to the tractor drawbar and the two remaining units are connected to either end of the frame of this section in such a way that there is a slight overlap. Naturally this type of roller would not have the crushing power of a single-axle roller of similar weight, but may prove very suitable for border-diked irrigation paddocks.

Main Value of Roller

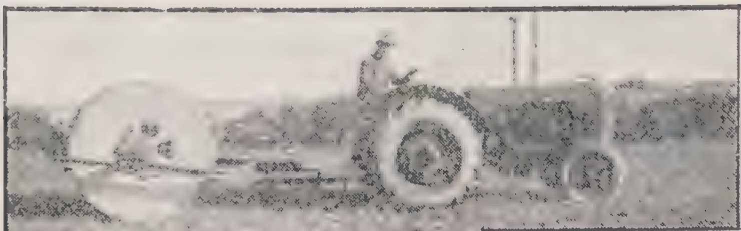
The primary object of the heavy roller is to bury stones. As mentioned previously a great deal of the lighter land in Canterbury in particular is of a stony nature. During cultivation operations the stones are invariably brought to the surface and when the land is sown down to grass the stones left lying on the top give the paddocks a rather unsightly appearance. Before the advent of the heavy roller the Cambridge roller was used occasionally to bury the stones, but this implement was not sufficiently heavy to do the work satisfactorily. Provided the ground is rolled when it is reasonably soft, most of the heavy rollers used in Canterbury today make a very good job of burying stones. The fact that on grass paddocks where a car could be driven only in low gear and with difficulty it is possible after heavy rolling to drive a vehicle at 30 or 40 miles per hour without experiencing trouble gives some indication of the efficiency of the heavy roller in disposing of stones.

Apart from improving the general appearance of stony paddocks the heavy roller provides a good surface for top-dressing, most of which in Canterbury is done by motor lorry so that the prior burying of stones by the roller allows the work to proceed smoothly.

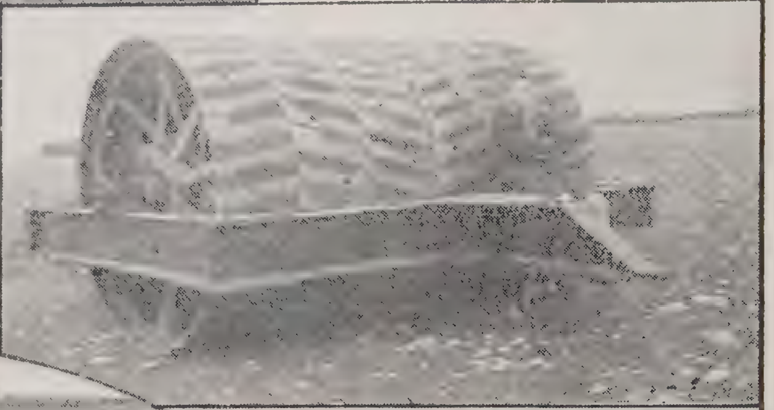
Harvesting Operations

Possibly one of the main benefits of heavy rolling of paddocks containing stones is that it provides a relatively-smooth surface for harvesting small-seed crops. Ryegrass, cocksfoot, red clover, white clover, etc., can be harvested for seed much more easily and successfully if the stones are buried, particularly white clover. Indeed were it not for the heavy roller white clover could not be harvested from many areas because of the stones. When harvesting white clover it is usually necessary to set the mower to cut very close to the ground and the heavy roller will leave a surface which is ideal for the mower. Loose stones are also extremely dangerous when a crop is being threshed from the windrow with the header harvester, because if a stone enters the drum it may do considerable

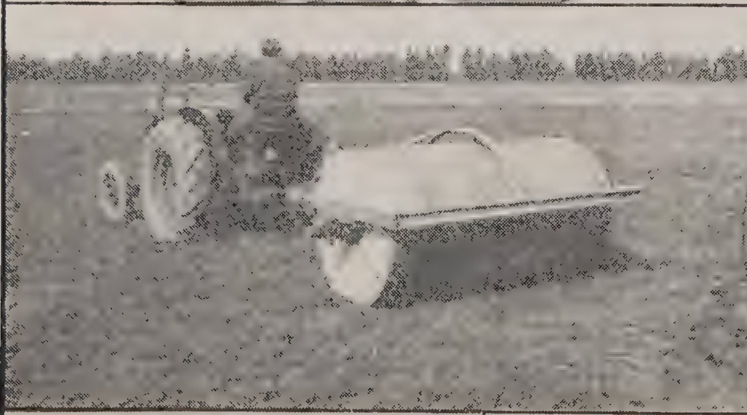
HEAVY ROLLERS USED IN CANTERBURY

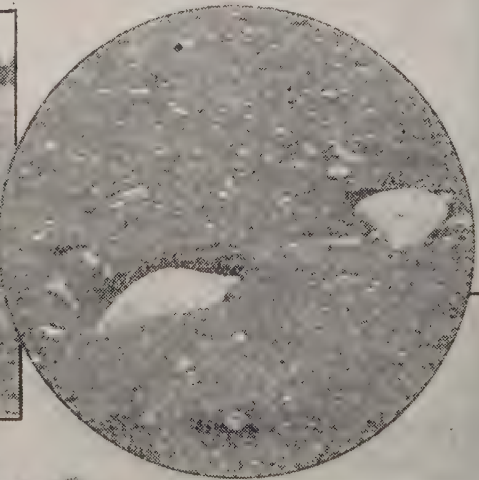


Above—Heavy concrete roller (estimated weight 6½ tons) made with 6 traction engine wheels. It is 5ft. 6in. wide and 4ft. 6in. high. Note the double-spring tractor hitch which reduces strain on the tractor when starting and on a down grade.

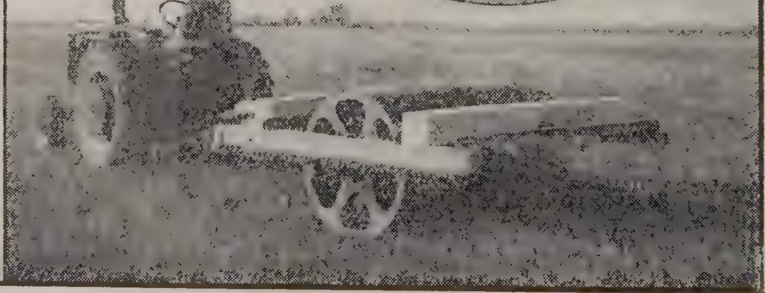


Above—Heavy roller, built from 6 traction engine wheels, which is 9ft. long and is estimated to weigh (with frame) 10 tons. Left—A typical view of many of the stony paddocks on the light land of Canterbury, which shows rolled (right) and unrolled (left) portions.





Above—Useful type of concrete roller for a relatively-small acreage. It is 6ft. wide, 3ft. 6in. high, and is estimated to weigh 5 tons. In the circle are shown stones buried by a heavy roller. Right—Roller made from 7 12in. engine wheels cased, but with no concrete. Two heavy concrete posts attached to the frame provide additional weight. (Estimated weight of roller 3½ tons.)



damage to the machine. This risk can be obviated largely by heavy rolling when the ground is soft enough to enable the stones to be buried satisfactorily.

Heavy rolling also provides a very good surface for haymaking operations—both mowing and the picking up of the crop with the baler are made much easier if a smooth surface is available.

Control of Grass-grub

In the author's article (February, 1946) dealing with the construction and the use of the first heavy roller in Mid-Canterbury it was suggested that heavy rolling of pastures might prevent or at least minimise grass-grub attack. Unfortunately there has been no success in this direction. After 2 or 3 years' experience of the heavy roller there is no evidence to suggest that paddocks which have been rolled are any less susceptible to grass-grub attack than those which have not been rolled. There is evidence that the crushing action of the roller will kill a proportion of the grubs near the surface, but not sufficient of them to prevent extensive damage to the sward.

In one case which came under the writer's notice an area had been rolled 6 times with a concrete roller weighing about 9 tons. Examination of the soil showed that almost a 100 per cent. kill of grubs had been obtained, and this was corroborated by an examination of the sward. Extensive grub damage was apparent where one rolling had been given, whereas the area which had been rolled 6 times showed no evidence of grass-grub attack. However, it would not be practicable on a farm scale to roll pastures to this extent.

It would appear, at the moment, that as far as grass-grub is concerned the use of the heavy roller must be confined largely to the repair or renovation of paddocks which have been damaged by the grub. In this respect the roller is likely to perform excellent work. However, rolling of paddocks about May, when grass-grub damage becomes apparent, is unlikely to be of much benefit in restricting the damage, as at this stage the grub is feeding greedily and any re-rooting which might take place as a result of consolidation can be offset largely in the months immediately following. To be most effective it would seem that this rolling should be carried out in late August or September. At this time the grub is going into the resting or pupal stage and therefore any plants which re-root as a result of the rolling are likely to survive. Furthermore, rolling at this stage will break down any surface crumb which the frosts have formed, and this will provide an excellent bed for any ryegrass or clover seed which may have been shed naturally or during harvesting operations.

Life of Pasture

Largely because the position is complicated by both grass-grub and porina damage, it is difficult to say at this stage whether heavy rolling will actually prolong the life of pasture on the lighter land. More experience is required before this point can be determined accurately. There is a suggestion, however, that ryegrass is persisting better in rolled than in unrolled paddocks.

After Cultivation

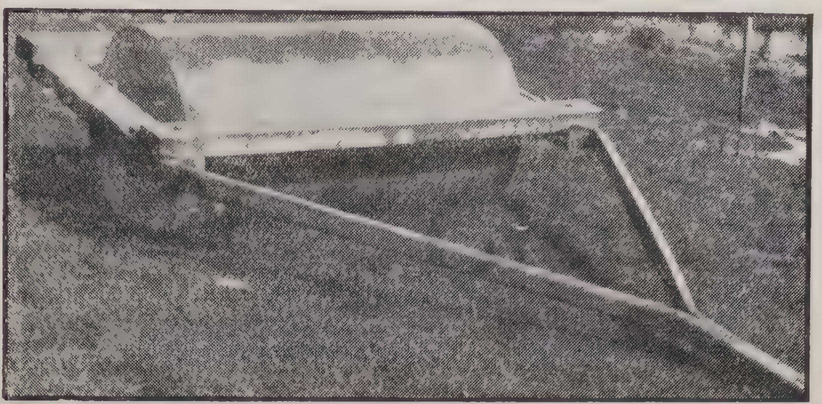
When the heavy roller first came into use in Canterbury some farmers considered that crushing the stones into the ground might make future ploughing of the areas exceedingly difficult, but such has not been the case. Many areas which were rolled 2 or 3 years ago have since been ploughed and farmers report that no difficulties have been experienced. Breakages of plough parts, such as skeiths and shares, have been no greater on rolled than on unrolled paddocks.

Value Accepted

Farmers frequently view new machinery or new implements with a good deal of suspicion and quite often considerable time elapses between the introduction of a machine or implement and its use to any appreciable extent by the farming community. Such, however, was not the case with the heavy roller. The idea that the roller would be very beneficial on light, stony country was readily accepted, and from the time the first one was made construction of others proceeded fairly rapidly. Today tractor wheels or other casing materials required for constructing rollers are exceedingly difficult to obtain, but if suitable materials were available at a reasonable price, many more heavy rollers would now be in use.

The prophecy made by some that, in a few years, heavy rollers would be relegated to the scrap heap has not materialised.

USE OF HEAVY ROLLER IN CANTERBURY



Lighter type of roller made from boiler casing filled with concrete. It is 4ft. 7in. wide and 2ft. 6in. high and is estimated to weigh 1½ to 2 tons. This roller is satisfactory for heavy land where stones are relatively small and not very numerous.

Left—Rolling a ploughed paddock with an articulated roller to promote rotting of the turf. To enable the roller to be pulled the area had first to be rolled with a Cambridge roller to give partial consolidation. Right—Rear view of the articulated roller operating on ploughed country.

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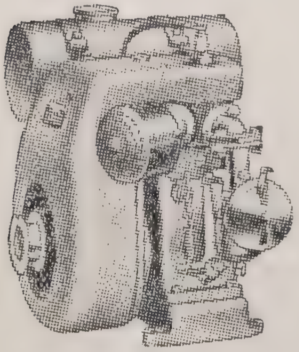

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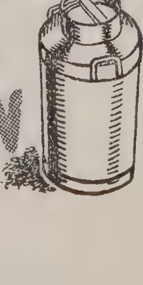

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Apricot Growing in Central Otago

CENTRAL OTAGO is the principal area of apricot production in New Zealand. Nowhere else in the Dominion are apricots produced in such quantity or of such quality as in the districts of Roxburgh, Alexandra, Clyde, and Cromwell. Consumers in all parts of the country are familiar with the good quality of this fruit, and each year many thousands of cases are bought by householders to be eaten as fresh fruit, made into jam, or preserved as a dessert for winter use. This article by F. M. Talbot, Orchard Instructor, Department of Agriculture, Roxburgh, describes this branch of the fruit-growing industry in Central Otago.

Eighty-year-old apricot trees still bearing good crops of fruit.

APRICOTS generally appear to thrive well in gold-bearing country. Gold has been found in numerous places in Central Otago, and modern dredges are still extracting it from land around Alexandra. The first apricot trees were planted in Central Otago during the later years of last century when miners were earning their living by fossicking for gold. Little did they realise that in planting those trees they were laying the foundation of the most important apricot-growing area in New Zealand.

The first trees planted were imported from Australia about 1867 and planted at Clyde, followed about 1868 by trees at Coal Creek, Roxburgh. Those trees established themselves quickly and showed such promise that further areas of land were prepared and planting was extended. Preparation of the land was slow, cultivating machinery being scarce or unknown and certainly more primitive than present-day implements. All land had to be hand grubbed and double trenched with spade or shovel before trees could be planted.

Some apricot trees in Central Otago claimed to be 75 to 80 years old are still growing well and bearing good crops of fruit annually.

The original trees imported from Australia have been proved to have been worked on plum stock. Root suckers from the stock were left until large enough and later budded to apricot varieties. Small nurseries were established in this way, and when sufficient trees had been raised they were sold to prospective fruit growers in various parts of the district. The famous Roxburgh Red apricot was propagated and named in a Roxburgh nursery in later years.

As the trees began to bear crops marketing of the fruit became a problem. Motor transport was unknown, and transporting the fruit by horse and cart to the larger distant centres was not possible. The only means of disposal was to local settlers and to the public at nearby race meetings and similar gatherings. Later a market was established in Dunedin, but long haulages had to be made by horse-drawn wagons to the nearest railhead or directly by road before fruit reached the market.

Climate and Topography

Central Otago's climate varies from season to season, but summers are usually very hot and winters very cold. Mild days and cool nights are usual during spring, and heavy late-spring frosts are frequent. The autumn is mainly dry, with warm days and cold nights. The winter is cold, with heavy continual frosts and occasionally snow on the low levels, and winds from the southerly quarter. Summers are usually hot and dry, and harvesting of the fruit is rarely delayed by bad weather. The maximum temperature in the shade during 1948 reached 98 degrees F. The average annual rainfall over the fruit-growing area is about 18in. During the winter temperatures range from 5 to 20 degrees below freezing point.

Roxburgh lies between two chains of hills in a wide valley through which flows the Clutha River. Orchard areas lie on both sides of the river and good sites for planting have been selected on the hillside and on the flat.

Alexandra and surrounding districts, though rugged and rocky in parts, have more flat areas, and some excellent orchard sites are on the banks of the Clutha in the gorge on the way to Cromwell.

Roxburgh is 318ft. above sea level, Clyde 555ft., Cromwell 629ft., and Alexandra 490ft.

Preparation of Site

The best apricots are produced on schist rock soil which over the years has been deposited from the ranges on to the lower slopes and in small deltas. Large areas of this type of soil occur on gentle slopes.

The soil which seems to be particularly suitable for the production of apricots is generally recent in deposit, and the parent geological materials appear to have greater influence on the trees than do more mature soils. Humus content is relatively low and generally the soils are light coloured. The granular structure enables a good tilth to be maintained, and the fertility is related to the amount of water available and the addition of organic matter.

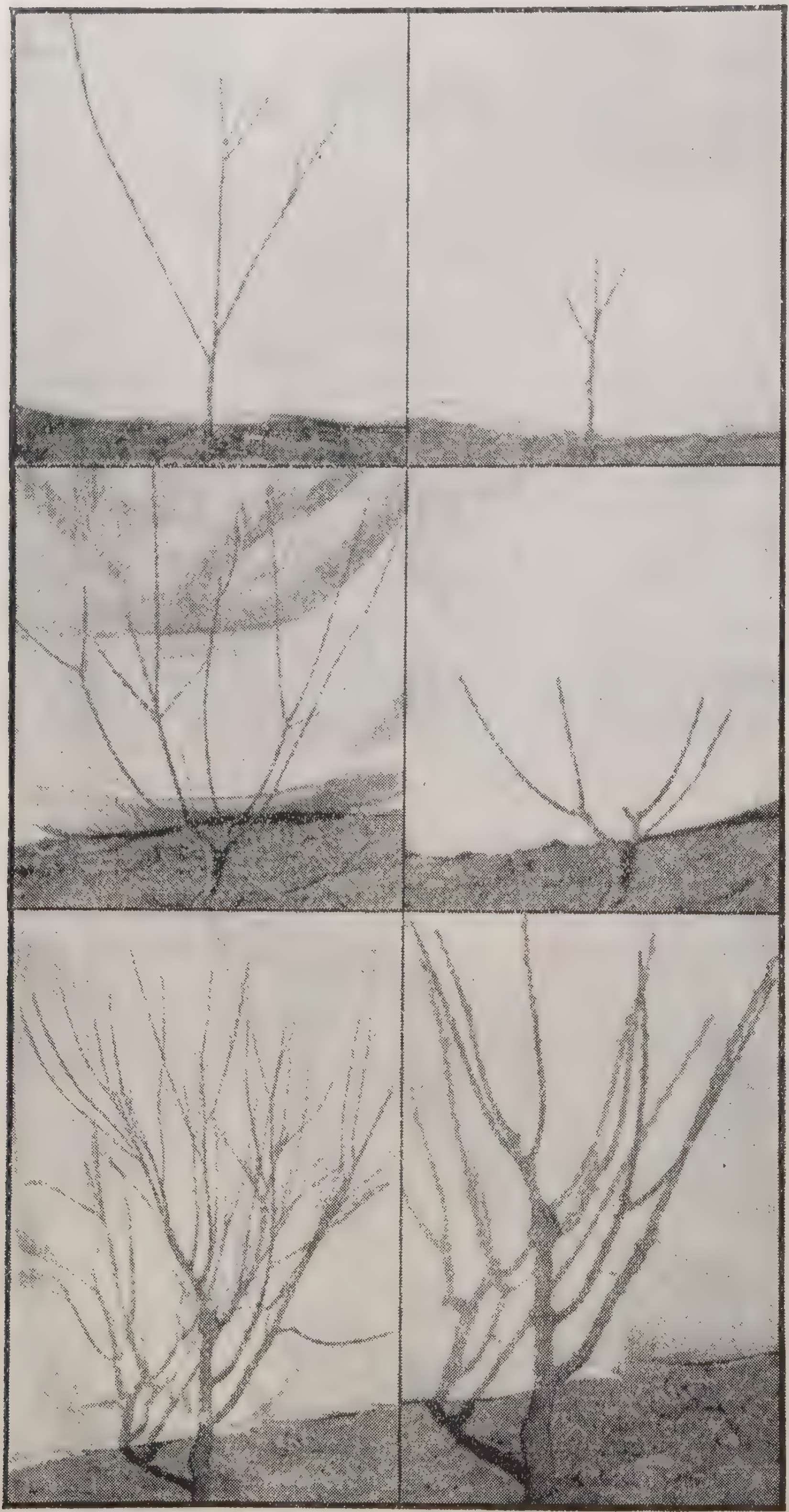
If possible, the site selected for planting should have a northerly aspect. It should be well cultivated and sown in suitable cover crops for at least 2 years before the trees are planted. Blue lupins, oats, barley, or ryecorn have proved suitable cover crops for adding humus content to the soil.

Liming at the rate of 2 tons per acre is also recommended.

Irrigation and Shelter

Because of the relatively-low rainfall and dry climate, irrigation is essential. A steady supply of water must be available, and irrigation of

APRICOT GROWING IN CENTRAL OTAGO



Young apricot trees before (left) and after being pruned. Upper—Yearling; middle—2-year-old; lower—3-year-old.

the trees must be regular and systematic.

Another essential to successful apricot culture is shelter. When new areas are being planted adequate protection of the young trees from strong winds should be a first consideration. Lombardy poplar or *Pinus muricata* is recommended as good, quick-growing shelter in Central Otago.

Varieties

The total of 71,200 apricot trees grown in Central Otago is made up of 32 different varieties, but 9 varieties account for 85 per cent. of the trees. Among the most popular varieties are Moorpark, Roxburgh Red, Oullins Early, Newcastle, Mansfield, Tilton, Hemskirk, Royal, Trevat, and Boulton.

Root Stocks

Experience has shown peach seedling root stock to be most suitable for gravelly and light sandy soil, Myrobalum plum stock for heavy soils of clay loam type, and apricot seedling stock for well-drained rich soils.

Where difficulty is experienced in obtaining sufficient trees of the right type for the planting of new areas, time could be saved by establishing a home nursery in which trees can be propagated. Many growers wait season after season to buy a few trees for replacements when in the meantime they could have propagated their own. For such a nursery a small piece of well-prepared ground, sheltered from strong winds, is essential. The soil should be free to enable good root growth to develop. The right stock should be selected and planted out in nursery rows which can be cultivated freely and kept clean. Attention should be paid to the young seedlings to obtain a strong, upright growth. When ready the young stock should be budded with selected buds from a healthy, well-bearing tree, true to the variety required. Budding is not difficult.

Planting

Planting should be completed by mid-August to allow the soil to consolidate and the trees to settle down before spring growth begins. On good land apricot trees should be planted from 20 to 24ft. apart, allowing 75 and 109 trees to the acre respectively when planting is on the square system. When the land and the trees are ready the area should be systematically lined out and pegs placed where the trees are to be planted. Holes should be dug at each pegged site, deep and wide enough to accommodate the trees and allow the roots to be spread.

Fertiliser mixed with the soil in the hole in which the tree is planted is beneficial; 2 parts of superphosphate and 1 part of bonedust is satisfactory. Two handfuls of this mixture should be thoroughly mixed with the bottom layers of soil. Fresh soil should then be made into a slight mound at the bottom of the hole, the tree placed on this mound, and the roots spread down the sides to give freedom for root action. The tree should be planted at about the same depth as it has been growing in the nursery.

Before a tree is planted any roots damaged during lifting in the nursery should be trimmed back to sound wood and some of the top growth may be removed. The first soil used for filling in should be worked down among the roots to ensure compactness. The remainder of the hole should be filled in and firmed down as planting is completed.

Pruning

Young trees: The principle in pruning all young trees should be to concentrate during the first few years on building a good framework. Rods should be cut to buds so placed as to encourage at least 3 good top shoots evenly spaced. Branched trees should have 3 well-spaced shoots carrying several buds; these shoots can be pruned back to 3 or 4 buds, leaving the top 2 on each shoot pointing in the direction the ensuing growths are required to take. All other growth should be removed.

Second season: The growth resulting from the buds left on each shoot the previous season will be sufficient to allow 6 well-placed shoots to be selected. These should be shortened by removing about one-third of their length. Any other growth the tree has made should also be removed.

Third season: The tree should now have 6 strong leaders for a framework, as well as side laterals. The lateral growth should be spaced as required and the growth of fruit-producing wood encouraged on the main limbs and lower parts of the tree. That can be done by eliminating unwanted shoots and leaving uncut the shoots which are required to produce fruit eventually.

Bearing wood: Apricot fruit is borne mainly on short spurs and yearling shoots which arise from the older wood. During annual prunings, provision should be made for the renewal of this type of wood by cutting back shoots which have fruited to a suitably-placed bud. Fruiting spurs should be thinned out lightly to space the fruiting parts as evenly as possible over all portions of the tree. In areas subject to heavy frosts pruning should not be so severe and more fruiting wood should be left.

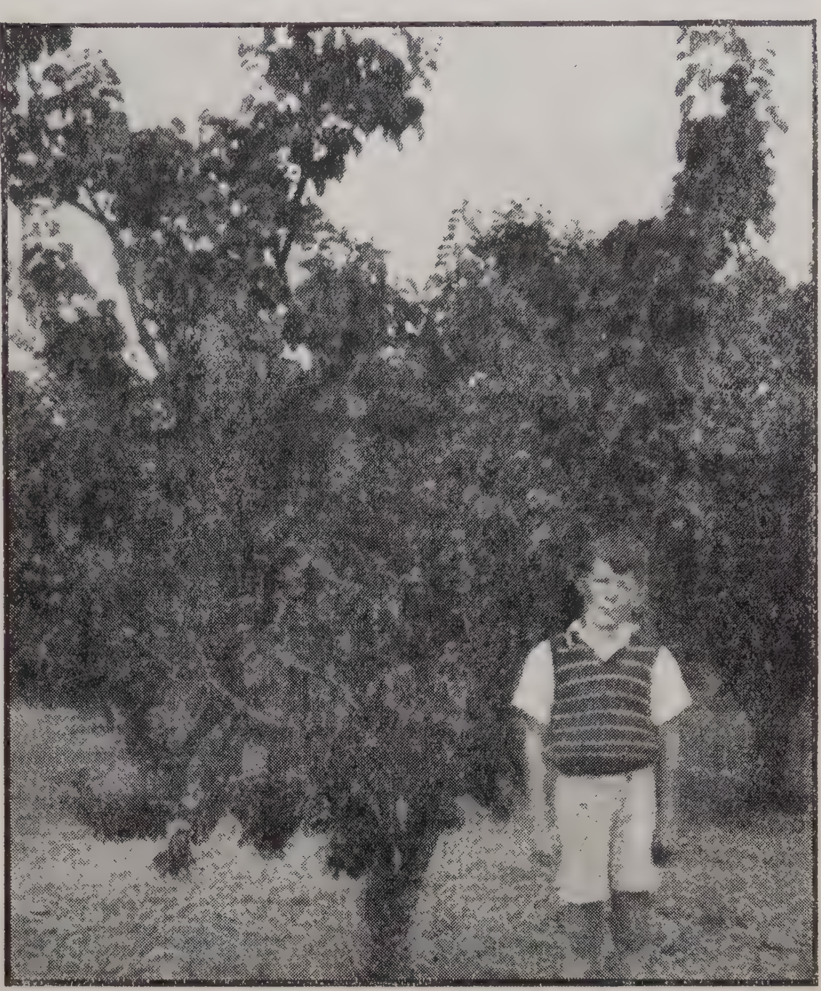
Cultivation

Adequate cultivation of apricot trees is important. Cover crops and applications of fertiliser should be turned under in spring before the trees come into bloom. Light summer cultivation is necessary to control weed growth and assist in the retention of soil moisture.

As the harvesting of apricots is completed earlier than that of most other fruit, the sowing of a cover crop in mid-February is usually possible, allowing it to become well established before the winter frosts begin.

Disease Control

Efficient spraying is essential for the control of fungus diseases and insect pests which attack apricots.



A well-grown 5-year-old apricot tree.

In addition to spray applications, the importance of orchard hygiene cannot be over-emphasised. All infected twigs, shoots, and mummified fruits should be removed from the trees and burnt. Much of this work can be done during pruning, but the affected parts removed should not be left lying on the ground beneath the trees.

Cleanliness is also essential in and around the packing shed where fruit is prepared for market. Bins on the grading machine should be kept clean and free of affected fruit, and cases should not be stacked away with remains of affected fruit adhering to them or be used during picking for the cartage of fresh fruit to the packing shed.

Brown rot (*Sclerotinia fruticola*) is a fungus disease which attacks the fruit, twigs, and young shoots. At present there is no really efficient spray control for this disease, which, if neglected, can cause serious losses in seasons favourable to its development and spread. The use of Bordeaux mixture applied at the bud-movement stage at a strength of 5 : 4 : 50 (5lb. of copper sulphate and 4lb. of hydrated lime to 50 gallons of water), followed by a further application at a strength of 3 : 4 : 50 at the pink stage of blossom growth, is the standard recommendation for its treatment.

Shot hole (*Phyllosticta prunicola*), another serious fungus disease attacking apricots, causes small brownish scabs to appear on the fruits. If the attack is serious, the fruit is made unfit for sale. Small roundish holes appear in the leaves, giving the foliage a shot-hole appearance and affecting the trees' natural functions. This disease can be controlled by application of Bordeaux mixture 5 : 4 : 50 at bud movement, followed by an application at the pink stage at a strength of 3 : 4 : 50.

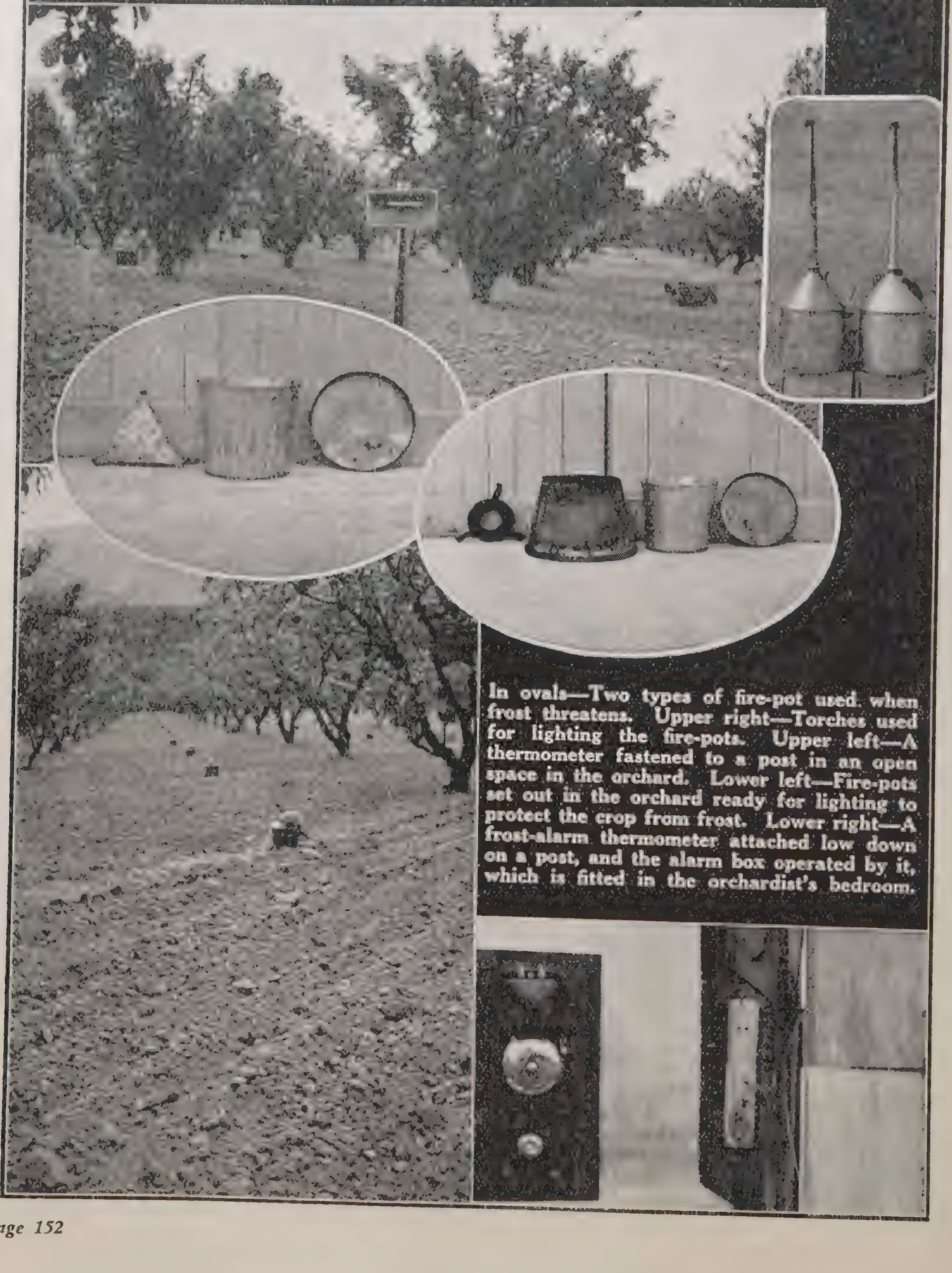
Apricot trees are intolerant of sulphur sprays, so Bordeaux mixture is the recommended fungicide. It can be applied with safety at the standard concentrations mentioned.

Scale Insects

For control of scale insects an application of 5 per cent. winter oil (1 in 20) during the dormant stage of tree growth is the standard recommendation.

Mussel scale (*Lepidosaphes ulmi*) is not a common pest affecting apricot trees in Central Otago, but occasion-

COMBATING FROSTS IN APRICOT ORCHARDS



In ovals—Two types of fire-pot used when frost threatens. Upper right—Torches used for lighting the fire-pots. Upper left—A thermometer fastened to a post in an open space in the orchard. Lower left—Fire-pots set out in the orchard ready for lighting to protect the crop from frost. Lower right—A frost-alarm thermometer attached low down on a post, and the alarm box operated by it, which is fitted in the orchardist's bedroom.

ally it is observed on young wood and on fruits. The scale can be recognised easily by its resemblance in shape to the shellfish from which it takes its name. The scale adheres to branches, young wood, and fruits, and it spreads rapidly.

San Jose (*Aspidiotus perniciosus*) is a scale insect affecting most fruit trees, including apricots. It is round with a raised centre, small, and greyish. When wood or fruits are affected the scale is accompanied by a reddish discoloration of the wood or a pinkish ring surrounding the scale on the skin of the fruit. Its spread is rapid.

Combating Frost Damage

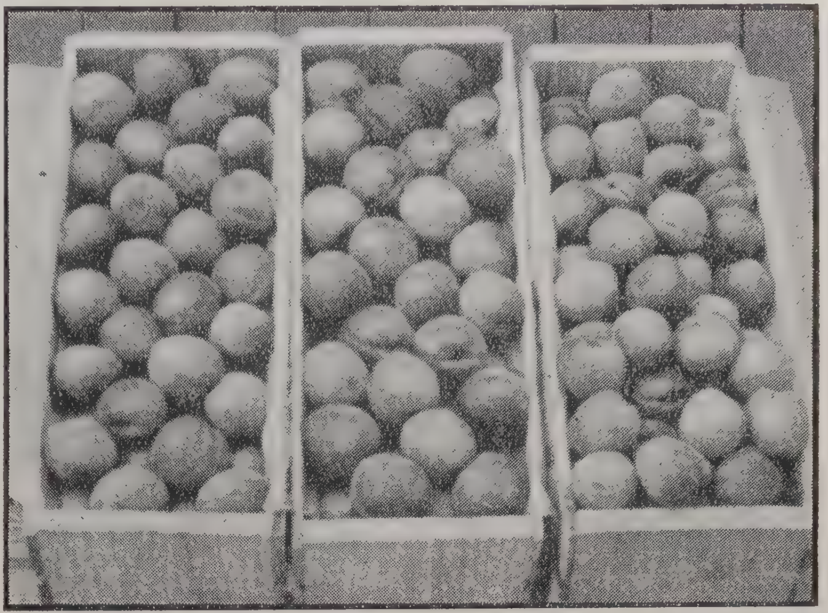
The most serious hazard with which the fruit grower in Central Otago has to contend is damage and loss of crop by frost. The stage of growth which the fruit achieves by late spring is particularly susceptible to the frosts which occur frequently at that period. Knowledge of frosts which occur with sufficient intensity to damage fruit crops has been relatively meagre in the past. Investigations are at present being carried out which, it is hoped, will throw a great deal more light on this important problem.

The use of fire-pots has proved effective in controlling damage caused by frosts up to 12 degrees F.; only partial success has been experienced during heavier frosts. Two types of fire-pots are in use, both being metal containers. The type used mostly holds 10 pints of fuel oil. A larger type introduced recently, holding 21 pints of oil, obviates refilling when a long burn is necessary. The small types in common use, fitted with spider and lid, are filled with oil in preparation for the emergency period and placed in the orchard, usually 1 pot to each tree, ready for lighting when wanted.

To warn the orchardist of a dangerous fall in temperature during the night, an alarm thermometer is placed in the orchard in a reasonably-open space between trees or in a vacant area close to the residence of the owner. This thermometer is usually fastened about 1ft. from the ground on a wooden post or suitable frame. An alarm box containing 2 batteries connected to a bell is usually placed in the owner's bedroom. The thermometer is connected to the batteries and a complete circuit formed from the thermometer outside to the bell in the residence. The circuit remains unbroken until the temperature reaches 31 degrees F., when the mercury in the thermometer parts, breaking the circuit and ringing the bell. This gives the grower sufficient time to begin lighting the fire-pots in the orchard before any damage is done.

Several thermometers are also needed in the orchard for checking temperatures—at least 1 to every 3 acres. They should be placed on posts at a convenient height from the ground for reading—about 3ft. 6in. It is most desirable that the positions selected for the thermometers be as open as possible. Readings cannot be relied on to be true if the thermometers are hung in trees.

Investigations in frost areas in America have resulted in the compilation of the following figures, showing the temperatures which apricot trees can stand for 30 minutes without damage: Bud closed but showing colour, 25 degrees F.; full bloom, 28 degrees; small green fruits, 31 degrees.



Two cases of apricots graded and packed and the right-hand case not packed, which is unsatisfactory.

Cool Storage

With the advent of shorter working hours, during the past few years many enterprising growers have had small cool storage chambers built close to their packing sheds so that the fruit may be held and pre-cooled for short periods, such as weekends and holidays, thereby avoiding the waste which frequently occurs if the fruit cannot be forwarded to the markets as soon as it is harvested. These chambers, though relatively costly to construct, have proved valuable to many growers in Central Otago.

Cropping

The crop produced depends largely on the size of tree, its location, type of soil irrigation, and cultivation practices. Odd trees are recorded as producing 30 or more standard 7in. x 7in. boxes each, but the average crop is 3 to 5 cases of this type per tree. In a favourable season about 40,000 bushels are produced from Roxburgh district and 50,000 bushels from the Alexandra, Clyde, and Cromwell area.

Harvesting

In a normal season harvesting is begun with early varieties in late December, the later varieties continuing up to late February. Approximate dates for starting the harvesting of the main varieties are: Newcastle, first week in January; Oullins Early, Roxburgh Red, Dundonald, and Trevat, second week in January; Mansfield seedlings, Tilton, Boulton, and Moorpark, third week in January; Late Royal, early February.

The stage of maturity at which the fruit is harvested depends on the orchard's proximity to the market. Fruit intended for North Island markets is picked in firm condition, just showing first signs of colour; fruit for South Island markets is picked in firm condition with a reasonable amount of colour showing. The fruit should be mature but firm, and sound judgment is necessary, as some fruit is required to withstand long journeys and arrive in good condition.

Careful handling of the fruit is essential. Usually it is picked into tins suspended from a belt around the waist of the picker. When the tins are full the fruit is emptied into boxes and conveyed to the packing shed for preparation for market.

Packing and Grading

Apricots are usually sized by machine, and sorters, while separating it into grades according to quality, are required to eliminate all reject and over-mature fruit, most of which can be used by jam factories.

All growers do not pack their fruit, and "rowing in" is practised with all sizes of graded fruit. Most growers pack sizes 1¾in. and upward in 7in. x 7in. cases, and all smaller sizes are rowed in, special fruit being packed in trays.

Most fruit is packed into boxes having an inside measurement of 7in. x 7in. x 18in., holding 18 to 20lb. of fruit. Specially-selected dessert fruit is packed in wooden trays 11½in. x 18in. and from 2½ to 3in. deep. Fruit of sufficient size is packed on the diagonal pocket pack system, each fruit resting in the pocket formed by the fruit in the layer beneath, thus reducing bruising or damage which may occur in transit.

CONTROL of RUSH GROWTH

Above—If labour is available, rushes may be chipped with spades, but that may be expensive if labour is hired for the work. Right—After being chipped the rushes should be heaped and burnt. Patch sowing of the chipped and fired areas should follow.

Above — Manuring and liming encourage clover and grass growth into the clumps of rushes, which become choked and further damaged by stock. Right—Set stocking with sheep does not provide good conditions for rush control.

HEADING PHOTOGRAPH: Heavy rush growth on a poorly-drained soil.

Methods of Controlling Rushes on Farm Lands

THROUGHOUT New Zealand appreciable areas of farm lands are not producing their quota of foodstuffs because of their occupation by non-productive plants. On some areas it may be second growth on reverting country, on others introduced species such as gorse and blackberry may be invading pastures, while on still others swamp growth and growth induced by wet conditions may be limiting production. In the last category is to be found the common rush, and in this article C. Walker, Assistant Fields Superintendent, Department of Agriculture, Palmerston North, deals with measures for its control and eradication.

MUCH of New Zealand's heavier and more fertile country tends to lie very wet for part of the year. That applies not only to flat areas, but also to much of the rolling country where, because of a fairly-high clay content, the soil texture is such that moisture does not move freely through the soil. Wherever waterlogging occurs—and that is perhaps more general on low-lying areas—swamp growth tends to develop even at the expense of established pasture.

Among the plants that invade such land the common rush is one which can be a serious menace to pasture lands over the whole Dominion. Rush plants thrive under conditions that are just too wet for good pasture without being so wet that they invite invasion by such other swamp vegetation as raupo and the water rushes. As these rather wet conditions inhibit pasture development, and even cause good species not only to weaken but frequently to die out, they provide an environment in which the rush thrives and in time dominates the area.

The annual loss in production and revenue from rush invasion of pastures would be difficult to assess accurately, but it must be fairly high, because of the large proportion of land forced out of pasture by the invading rushes and the weakening of the remaining sward.

The conditions conducive to rush spread and dominance are largely those that result in pasture weakening. High soil-moisture content to a stage approaching waterlogging, a consequent souring of soil conditions, and a loss in carrying capacity are all factors that lead to rush dominance. Fortunately the steps necessary to correct those undesirable conditions also will lead to vastly-improved conditions for pasture development. Thus, rush elimination and pasture improvement can be effected in one set of operations and consequently with a minimum of expense.

Importance of Drainage

Whether the country is flat or rolling, drainage is of paramount importance in the attack on rush growth. No amount of other treatment will be fully effective until good drainage has been provided, so a sound scheme of open or underground drains, or both, should be planned at the outset.

On flat country a minimum of open drains may be necessary, with feeder closed drains of the tile, brush, or mole types spaced within fields to draw off all surplus moisture.

On rolling country, provided the soil is suitable, mole drains are the simplest and most economical to establish. From the general slope, the disposal of water on undulating country may be assumed to be sufficiently provided for, but that is correct only of the normal run-off from the surface; it does not apply to that water which soaks through the surface and is held within the soil and the subsoil immediately below it. If drainage does not dispose of this water, a waterlogged condition is likely to develop, with a consequent invasion by rushes at a later stage.

Drainage should precede all other steps which might be taken to suppress rush growth. In fact, in bringing in new country of this nature it would be advantageous to attend to all drainage problems in advance of other development work. However, where the surface growth of rushes is strong or the soil surface uneven because of poaching, it would be desirable to work the land down by cultivation and sow it in pasture before any attempt was made to establish mole drains which might be destroyed during such working.

Dense Rush Growth

Rush growth which is so dense that pasture is either practically non-existent or so weakened as to have little real value can be reduced and the land prepared for pasture by one of two methods.

One is to plough down the rushes with a swamp plough, turning a wide and deep furrow to invert the soil completely. The land should then be rolled to compress the soil and to help smother the rushes, after which light discing of the surface will prepare a seed-bed sufficient for the reception of a pasture mixture. Provided it is practicable and time will permit, mowing the rushes in advance of ploughing is advantageous, resulting in a better cover and a much more even settling of the land.

Where mowing is not practicable, possibly because of the land contour or heavy poaching of the surface, a

Land between rush clumps frequently becomes heavily poached in winter. That prevents surface run-off of water, leading to a waterlogged condition conducive to heavy rush growth.

flame thrower can be used to burn off the top growth. As with mowing, this will lead to a better finished job when ploughing is done, and the land will settle down much better than where the large clumps are turned under.

These areas should be ploughed in late spring before the soil sets too hard, and rolling should follow immediately. Discing down before seeding can be delayed until a week or so before the seeds mixture is to be sown, but if there is any sign of rush rejuvenation between the furrow slices, an earlier discing would be desirable to check such growth.

The seeding should be generous with vigorous species such as the ryegrasses, timothy, cocksfoot, and white or strawberry clover, according to local conditions. It should be accompanied by a liberal manuring and liming to ensure that the pasture lacks nothing for its successful establishment.

A method which dispenses with ploughing consists of discing down a heavy rush growth with a set of giant discs. If these are used in late spring before the soil sets hard, 3 cuts will so reduce the growth that the area will resemble a cultivated field. This work should be followed by periodic summer discing to destroy any incipient rush growth. Though this treatment may be followed by pasture sowing in the autumn, a heavy sowing of some winter cereal for greenfeed is preferable. For this purpose oats are very satisfactory, as they can be permitted to develop into a hay crop in the following spring. This should be followed by a late summer fallow, during which the land must be cultivated to provide a relatively-clean seed-bed in the following autumn for the sowing down of pasture with fertiliser and lime.

Control on Fair Pasture

Where a pasture of fair quality contains an appreciable amount of rush the worst of it may be reduced considerably by chipping, burning, and patch sowing of the bared ground. Chipping must be done thoroughly if it is to be effective; rush clumps grow from the outer edge, so the spade cut should begin a few inches from the clump and be deep enough to remove all shoots. These clumps can be heaped in the field and burnt later, after which the soil accumulations should be harrowed to spread this material. Burnt patches should then be sown, and seed should be sprinkled on all chipped surfaces. Unfortunately the cost of chipping now rather limits the extent to which it can be done by hired labour or by contract. At day labour rates the cost for chipping alone has exceeded £6 per acre.

Alternatively, late-summer mowing of rushes offers a useful means of gradually eliminating this weed. Associated with this practice must be a supplementary seeding, where necessary, but more especially a liberal manuring and liming to build up the sward and offer competition to the rushes. Fortunately, rushes will not tolerate strong competitive growth from grasses and clovers, so if these species can be induced to work into the rush clumps, and mowing can be employed as well, the strength of the rushes will decline rapidly.

Land in the condition of that in the upper illustration or that on the previous page requires to be ploughed or heavily disced to restore it to production. Three cuts of giant discs produced this condition.

Good grazing management can also be an important factor in rush control. Alternate spelling and quick grazing by heavy concentrations of stock will do more to subdue this weed than will set stocking, which has the disadvantages of light and selective grazing. The maintenance of fairly-long pasture growth helps to reduce the incidence of rushes, as this growth offers competition by its density and the exclusion of light. For that reason cattle are more useful in effecting control than are sheep, which keep the grass growth cropped too short, to the advantage of the rushes.

Good Husbandry the Key

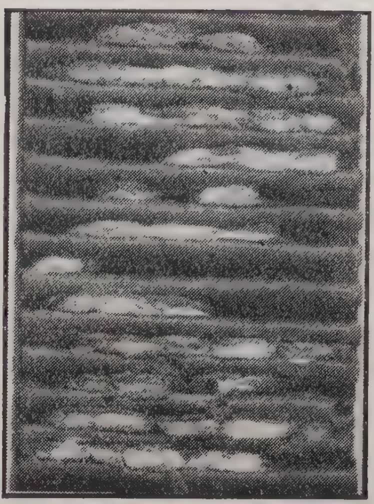
Control of rush growth depends on good soil and pasture husbandry. Adequate drainage is of first importance, and if it is provided, progress by other means can be effected with ordinary good farming; without it there is little hope of improving conditions. Whether or not the rush clumps have to be removed by ploughing, discing, or chipping, the introduction of such good farming practices as manuring, liming, and stock manipulation will do much to eliminate this weed.

Almost every district has considerable areas growing rushes. Invariably these are on country of potentially-high production that the Dominion can ill afford to lose to this weed, especially at a time when still greater farm production is required. It is of national importance that land owners ensure that such areas are brought to a state of production in keeping with their potentialities.

Tree Banding for Codling Moth Control

By R. E. BINFIELD, Horticultural Superintendent,
Department of Agriculture, Dunedin.

AMONG the many orchard pests with which growers of pip fruit have to contend the codling moth can be considered one of the most serious, more so in fruit-growing areas where climatic conditions are favourable to its seasonal activities. Tree banding, when properly used, is a means of destroying the grubs of the moth and so preventing them from completing their life cycle. However, it is a control measure which can be taken only after the grubs have passed through their period of activity on the tree or fruit. It must be emphasised that thorough application of sprays is the most efficient form of control.



[*Sparrow Industrial Pictures Ltd. photo.*

Fig. 1—Grubs trapped in corrugated cardboard bands in 2 months in a small domestic orchard.

THE damage caused to apple and pear crops by the larvae of codling moth in districts where infestations are severe is difficult to estimate. The losses sustained through blemished fruit qualifying only for the lower-priced grades plus the quantity which has to be rejected are usually absorbed under cost-of-spraying items when the out-turn of the season's crop is finalised and are not considered as an individual item of loss of profit.

The extent of infestation each season varies in the fruit-growing districts, but is generally more severe where winters are milder. The activities of the moth, which is usually on the wing during warm evenings in late spring, are difficult to control. It is in late spring that the moth lays the eggs from which the young grubs hatch and it is from this period onward that the recommended sprays should be applied thoroughly at the standard strengths, if efficient control is to be obtained.

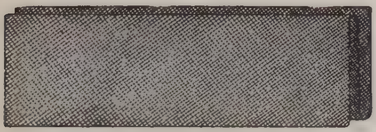


Fig. 2—Hessian band folded ready for nailing to a tree.

Though the practice of banding trees for the purpose of trapping the larvae of the moth during the period of pupation has proved a valuable aid to spraying by reducing the moth population in districts where infestations are severe, tree bands can in no way be considered as a substitute for spray applications. Bands can, with proper attention, only assist in the destruction of the larvae, which shelter in them.

Where bands are used as an adjunct to regular and thorough spraying they should be inspected periodically and replaced where necessary. Bands containing larvae should be burnt immediately after being removed from trees.

Life Cycle

The life cycle of the codling moth includes a period in which the young grub hatched from the egg feeds on the fruit until it emerges from the fruit. Following the feeding period the grub finds a suitable resting place in which to remain for a period before pupating and finally emerging as a moth. The rough bark on trees provides attractive places for the grubs to shelter and spin cocoons and by placing tree bands around the trunks of trees suitable shelter, which can be conveniently destroyed by the grower, is provided.

Treated bands, which are impregnated with a solution which kills the grub after it has sheltered beneath the band, thereby obviating the necessity of changing the bands during the season, have been obtainable, but where they cannot be procured efficient substitutes can be made from strips of corrugated cardboard or hessian. That corrugations in the cardboard provide attractive sheltering places for the grub is illustrated in Fig. 1, which shows grubs trapped in 2 months from apple trees in a small domestic orchard.

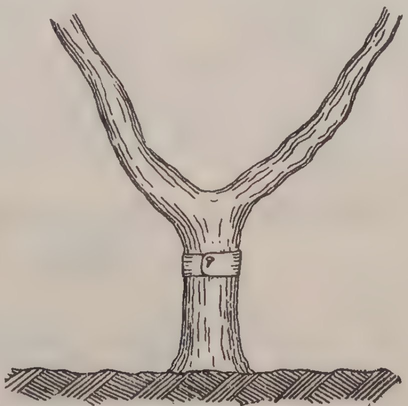


Fig. 3—Position in which to apply tree band.

Making Bands

Bands should be cut about 4in. wide from ordinary corrugated cardboard case liners, which are ideal for the purpose. If a number of sheets are placed together, strips of the required width can be cut with a fine-tooth saw. The cardboard should be cut so that when the strip is placed round the tree the corrugations in the cardboard are vertical. The strips when cut can be joined by glueing a portion of the end of them to the succeeding strip so that they form a complete roll which is easy to carry about when banding is being done and avoids waste of cardboard, as bands can be cut to correspond with the circumference of individual trees.

Hessian bands should be cut into strips at least 9 to 12in. wide and folded into three folds, one opening at the top and one below (see Fig. 2).

When bands are being fixed in position they should first be placed round the butt just below where the tree forks and secured there by a single nail driven into the tree on a downward angle (Fig. 3). This makes them easy to attach and to remove for inspection or for replacement.

It is most important that bands be inspected and changed where necessary throughout the season. The moths begin to emerge from the cocoons in the spring, but it may take a considerable time for the whole of a brood to emerge and therefore grubs enter the dormant stage at different times. Hence the need for inspecting the bands so that grubs sheltering there may be destroyed as soon as they are established. If untreated bands are left without being changed or destroying the grubs, they serve only as shelter from which moths will emerge the following spring at the completion of the life cycle.

It is also advantageous to scrape the very rough bark from the butts of trees to destroy any grubs sheltering there, and, though this work is costly from a labour point of view, anything that can be done to decrease the codling moth population on individual orchards where infestation is severe assists materially in reducing the loss of fruit resulting from the ravages of this pest.

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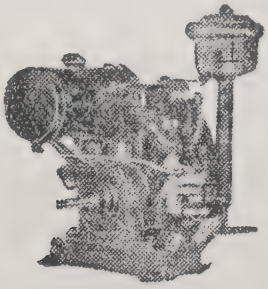

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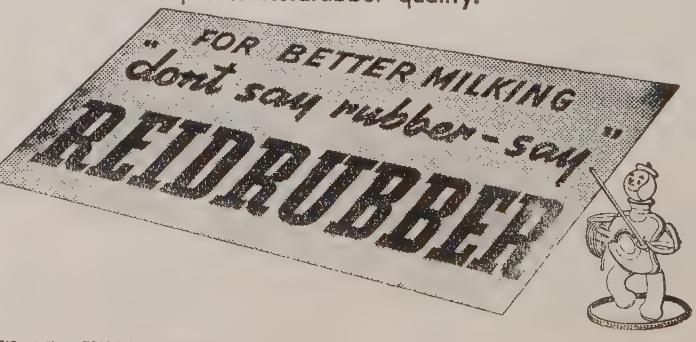

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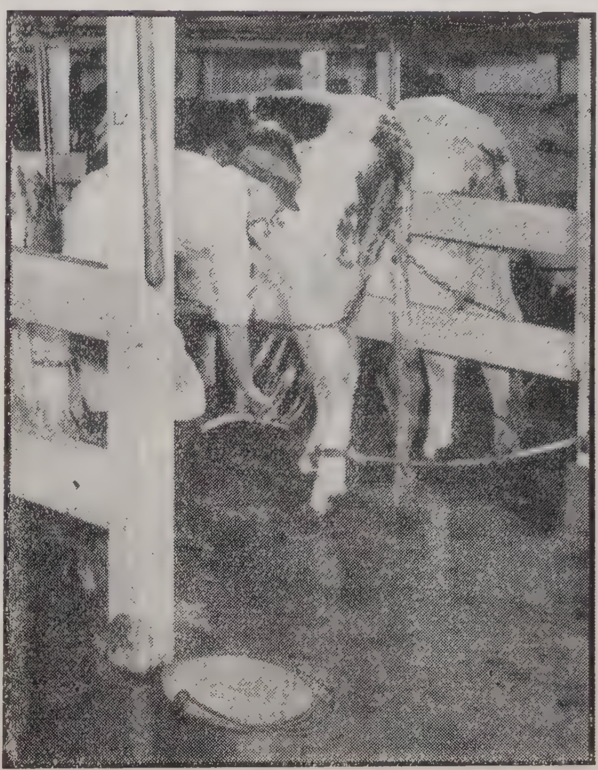
FARM DAIRY INSTRUCTION SERVICE

THE need expressed by factory managers and recognised by leaders in the dairy industry for the establishment between dairy factories and dairy farmers of a link with expert knowledge of the care and handling of milk and cream and some experience of manufacturing requirements brought about the birth of the Farm Dairy Instruction service to assist in promoting and maintaining the manufacture of uniformly high-quality produce. The service was established on a national basis in 1938. This article on the history and objective of the service by W. G. Batt, Supervisor of Dominion Farm Dairy Instruction, Department of Agriculture, Hamilton, is the first of a series in which subsequent articles will deal with the method and practice of Farm Dairy Instruction, its relationship to milk and cream grading, the milking process, the cooling of milk and the separation of cream, quality faults common in milk and cream before delivery to manufacturing dairies, the care and treatment of milk and cream, and the cleaning of milking machines and dairy equipment.



Since Farm Dairy Instruction became universal 10 years ago it has become firmly established as an activity of the industry recognised by manufacturing dairies and producers alike as an effective means of assisting in problems common to both. Advice and assistance are regularly sought by both in the improvement of the quality of the raw product and to improve the keeping quality and uniformity of the manufactured goods.

EVER since the inception of dairying in New Zealand the experts engaged in the manufacture of dairy products have recognised that it is impossible to make high-quality products from inferior milk and cream. They have recognised, too, that a small quantity of inferior milk or cream may prejudice the good quality of a large quantity of manufactured produce.

These fundamentals are the foundation of uniformly good-quality manufactures, and so it is not surprising that such experts engaged in the management of dairy factories have expressed through their directorates and in other ways since the inception of dairying the need of a link between the receiver of milk and cream—the dairy factory—and the producer of milk and cream—the dairy farmer—a link with expert knowledge of the care and handling of this produce and some experience of manufacturing requirements.

The need of this assistance, expressed by factory managers and recognised by the leaders of the industry, brought about the birth of Farm Dairy Instruction, a system requested by the industry to assist in promoting and maintaining the manufacture of uniformly high-quality produce by maintaining and improving the quality of the material from which it is made.

Requests for assistance to their suppliers in improving the quality of milk and cream were made shortly after the first dairy companies began operations, and in these early years of dairying as much help as possible was given by the Dairy Instructors engaged in instruction in dairy factory practice.

First Unified Scheme

Farm Dairy Instruction was first introduced as a unified scheme during the years around 1912 when, as a result of requests made by dairy companies and groups of dairy companies, officers were appointed to carry out these duties in conjunction with the supervision of butterfat testing and, in some cases, Association Herd Testing.

PAKEHA BRAND BUTTER

PHOTOGRAPHS: Top right, Sparrow Industrial Pictures Ltd.; bottom left, National Publicity Studios.

FARM DAIRY INSTRUCTION SERVICE . . .

The "Voluntary" System

Repeated and more widespread requests continued and in 1918 what has been known as the "voluntary" system came into being. The suggestion of the industry was that those companies or groups of companies requiring such assistance should make application to the Department of Agriculture, which would appoint an officer to their service, the dairy companies to pay half the salary plus locomotion costs. The dairy companies had the right to dispense with the service at any time if they so desired.

This development was an important forward step and the majority of dairy companies throughout the North Island immediately took advantage of the service, which had become more desirable to the industry because of the system of cream grading and at a later period milk grading, and its differential payments which had been introduced a little earlier and was fast becoming firmly established. Even several small companies which had insufficient suppliers to warrant the employment of one officer overcame this difficulty and the cost factor by combining with neighbouring small companies to secure the service in their joint interests.

In making their requests to the Department of Agriculture for the appointment and control of officers to their service, rather than make the appointments themselves, the dairy companies rightly concluded that although the majority of suppliers are conscientious and anxious to improve the quality of their produce wherever possible, there is a smaller percentage of careless individuals who by their lack of responsibility do not observe satisfactory conditions or respond to instruction and advice. Inferior milk or cream received from such sources could prejudice the efforts of the suppliers of good quality, and the industry correctly decided that the officers engaged in this work should be vested with the powers of inspection conferred by the Dairy Industry Act so that the necessary pressure could be applied to unsatisfactory conditions and to those cases where the penalties of inspection are more appropriate than the suasion and advice of instruction.

By its instruction and advice at a period when a knowledge of the care and handling of milk and cream was not as advanced as it is today, the voluntary scheme thus introduced gave excellent results, although as a system it had some disadvantages, an important one being that it was not universal in application. The tact and discretion of the officers employed and the service they rendered laid a firm foundation, and within a few years the industry pressed for the establishment of the service on a national basis. For several years successive annual conferences of the National Dairy Association passed resolutions requesting the Government to extend the scheme to a Dominion coverage, and in 1938 the national system of Farm Dairy Instruction came into being and provided the service to all dairy factories and their suppliers throughout New Zealand.

System Requested by Industry

From this brief history it is seen that the system of Farm Dairy Instruction originated from the requests of dairy factory managers for assistance in improving quality during the first years of dairying, and each progressive step toward the national system of today has been suggested and requested by the dairy industry; neither the system, nor any stage of it, has been introduced by any Government or Government Department.

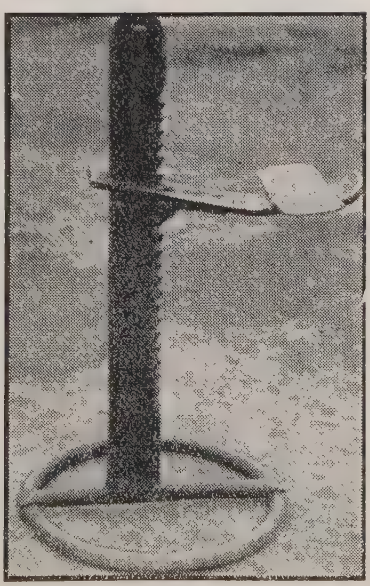
In the 10 years that have passed since the introduction of the universal scheme it has become firmly established as an activity of the industry, an activity recognised by the manufacturing dairies and producers alike as an effective means of assisting in the problems common to both. The advice and assistance of the Farm Dairy Instructor are regularly sought by both in the common objective of improving the quality of raw produce in order to maintain and improve the keeping quality and uniformity of manufactured products, a large proportion of which has to stand the long and exacting test of transport to markets overseas.

The Dairy Division of the Department of Agriculture, which controls and directs the activities of the 77 Farm Dairy Instructors employed in this service, recognises that the majority of dairy farmers fully realise the necessity for the maintenance of highest-quality dairy production and are anxious to improve it wherever possible. It also recognises that the quality of milk and cream is fundamental to the quality of manufactured products, despite the improvement which can be made by modern machinery and modern methods of treatment.

Service's Objective

Farm Dairy Instruction, therefore, has as its objective the promotion and maintenance at a high level of the aggregate quality of milk and cream, and to this end it proffers through this service all possible advice and assistance to farmers who are anxious and willing to improve the quality of their output. It will also apply the pressure of the powers and penalties conferred by the Dairy Industry Act to the minority of cases which produce unsatisfactory quality through carelessness and neglect, so that the good efforts and good quality of the many are not prejudiced by the carelessness of the few. In co-operative dairying, in view of the fact that the manufactured produce is the property of all suppliers to the factory and its quality determines to some extent the return received by all, it is fair and necessary to require a reasonable standard of cleanliness from all suppliers. The objective of Farm Dairy Instruction is to maintain that standard among the majority of producers by the guidance and assistance of instruction, and to obtain that standard among irresponsible suppliers by exercising the pressure and penalties of inspection.

Steel Cup Stand for the Milking Shed



VARIOUS contrivances to prop milking machine cups have been evolved since the time when battered but handy petrol tins were in fairly common use in milking sheds. Unhygienic wooden contrivances are now making way for the efficient ratchet type of steel fabricated cup stand illustrated. This is easily made by a blacksmith, and the ratchet is more satisfactory than a section of rubber inflation to set the height of the prop.

Up-to-date sheds in the main dairying districts are adopting this type, keeping one stand for each set of cups. Only a small proportion of the cows of a herd require a prop during milking, though heifers frequently do, and a prop may be needed with a cow that kicks off the cups. Often some slight support is required to give proper suction.

Farmers who do not strip after machine milking should not leave a prop supporting the cups longer than necessary. Before the milk flow slows up, light pressure by hand on the cups coinciding with the vacuum obtains the last of the milk. With some cows light weights are added to the cups toward the end of milking. Careless use of a cup stand for several milkings can cause a cow to become a stripper for the rest of the season.

In a few cases cup stands have been made robust enough to serve as a seat for the milker when not in use as a cup support.

—E. M. BATES,
Instructor in Agriculture, Department of Agriculture, Hawera.

SETTLEMENT OF RETURNED SERVICEMEN ON LAND DEVELOPMENT BLOCKS

THE responsibility for settling returned servicemen on the land is shared by the Rehabilitation Department, the State Advances Corporation, and the Lands and Survey Department. At March 31, 1948, a total of 5158 men had been settled on the land with rehabilitation assistance, partly on farms individually purchased with loan assistance and partly on farms wholly or partly prepared for settlement by the Lands and Survey Department, for which purpose the Department had purchased 640,788 acres and set aside 74,610 acres of Crown land. At March 31, 1948, 304,478 acres, providing 939 units, had been allotted either on permanent tenure or wages basis with promise of a title, and a further 366,055 acres, estimated to provide 807 units, was being prepared for settlement. This article by J. M. Miller, Assistant Field Economist, Department of Agriculture, Auckland, deals with the land development operations of the Lands and Survey Department in the North Auckland and Auckland Land Districts, where large areas of Crown and purchased land are being developed for servicemen's settlement, and contains a section on housing on servicemen's settlements by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland.

THE preparation of land for settlement is no new State activity. In the past it was frequently undertaken both to provide work during periods of general unemployment and to improve marginal land the development of which was not attractive to private enterprise. The immediate need to provide farms for the settlement of servicemen has, however, accelerated these activities.

However, the purpose which has been given to all the schemes and has enabled them to progress through the evolutionary method of trial and error has been the desire of public-spirited men to see the wastelands of the country properly utilised.

Nowhere else in New Zealand was the wasteland problem so conspicuous as in the Auckland and North Auckland Land Districts, and it is there that in response special branches of Government have evolved to cope with the situation, namely the Land Drainage and Land Development Branches of the Lands and Survey Department.

The Lands and Survey Department (usually known as the Lands Department), with its Land Districts and their respective Commissioners of Crown Lands, was established after the abolition of provincial government in 1876. Its primary function was to make a trigonometrical survey of the land surface of the country, establishing base lines and trig stations on the accurate location of which depended the success of the Torrens system of easy land transfer that had been adopted instead of the old deeds system.

As the surveyors of the Department spent most of their working lives in backblocks camps, they got to know the country better than anybody else, and whenever new Departments of Government were needed to deal with land and agriculture they usually started as offshoots or branches of the Lands Department. The Stock Department and the Agricultural Branch of the Lands Department grew into the Department of Agriculture; the Forestry Branch grew into the State Forest Service; the Advances to Settlers Branch grew into the State Advances Corporation; the Land Drainage Branch remained as part of the Department, because it was headed by surveyors and engineers, and so did the Land Development Branch, but the last-named has grown enormously on account of the extraordinarily-accu[illegible] business it does. To understand the growth of [illegible] participation in the farming business it is necessary to consider the history of the Drainage and Development Branches in more detail.

LAND DRAINAGE BRANCH

The wastelands of the Auckland Province were the swamps, the gumlands, and the pumice lands. The swamps were the first to be tackled, because as long as the gumlands yielded other wealth they were not of much interest agriculturally, and the pumice lands were considered a hopeless farming proposition because of the cattle sickness due to their cobalt deficiency.

Heading photograph by "Weekly News."

LAND DRAINAGE BRANCH OPERATIONS . . .

A Royal Commission of Enquiry into the Kauri-gum Industry, set up in 1893 to investigate rumours and allegations about the employment of Dalmatian gum diggers, was given a wider field of investigation by the appointment to it of Gerhard Mueller, the Crown Lands Commissioner in Auckland. The Commission's report contained the following passage:—"The connexion of the gumdigging industry with the settlement of the country is one of the most important matters affecting the future of the district north of Auckland. . . . In the first place there is a number of instances of gumdiggers who have become settlers and who must be regarded as having done permanent good to the country. Another important benefit derived from the gum industry is the resource which it offers to small settlers, who, when the farming work is slack, go to the gumfields to earn a little money, by which means, and by which means only, a very large number of them have been able to maintain their position and to keep their holdings. . . . Upon the whole, where gumdigging and agriculture have thus gone hand in hand, it has been to the advantage of settlement." (1) The State's part in the matter rested there, however, until the Fields Division of the Department of Agriculture took it up and worked out a method by which the gumfields could be satisfactorily grassed.

The Dalmatians, however, had made a very good impression on the members of the Commission, and in view of the evidence of their skill as drainers, the Crown Lands Commissioner offered to let their leader have the Tokatoka swampland at 7s. 6d. per acre if they would undertake co-operatively to drain it and develop it. (2) The Dalmatians refused this offer, as they mistakenly believed that they would be returning to their own country when they had earned enough money to buy land there; eventually most of them did take up farming in New Zealand, but their chance of securing the largest piece of rich meadowland in North Auckland (30,000 acres) was gone. The Public Works Department undertook its drainage and development, first erecting a stop-bank along the Northern Wairoa River to keep out the brackish, muddy tides whose increments of silt had raised the swamp out of the bed of the Kaipara Harbour.

In 1916 a local historian wrote: "The name Tokatoka Swamp is one that is passing away, and in a few years it will be almost forgotten. The reason for this is that the large area once known only as the Tokatoka Swamp has been replaced by the splendid farmlands of Naumai, Raupo, and Ruawai. . . . The result is that the Tokatoka Swamp, which in 1890 produced nothing, is now turning out more value in beef, cheese, and butter than any other portion of the north of Auckland acre for acre. . . ." (3) The Raupo Drainage Board took over from the Public Works Department in 1905 and finished the job with Government assistance.

The outstanding success of the Tokatoka Swamp scheme revived interest in other vast swamps of the Auckland Province. Some of these, mostly in the Middle Waikato Basin, had been tackled by the big land companies of the previous century. The Waikato swamps were of sour peat, very difficult to manage, and the combination of this fact with that of the failure of the land companies in the financial crash of the early nineties effectively prevented the flow of private capital into further swamp-drainage schemes. However, there were other swamps of river-borne silt and raupo vegetation similar to Tokatoka, and the development of these was officially invested in the Lands Department and various local drainage boards by the Land Drainage Act, 1908, and other special drainage Acts. The local boards raised their money through rates, but to permit public funds to be used for the drainage of Crown land special Acts were required from time to time, until in 1915 the Swamp Drainage Act gave power to the Minister of Lands to manage the schemes by Order in Council.

The Land Drainage Branch of the Lands Department began operations on the Hauraki Swamp in 1908, on the Rangitaiki Swamp in 1910, at Kaitaia in 1917, and thereafter at Hikurangi,

Ngakuru Block in the Rotorua district was developed by the Department of Agriculture on behalf of the Lands Department under the Land Laws Amendment Act, 1929.

Waihi Estuary, and Poukawa, and on various blocks for settlement of soldiers of the First World War. (Some cultivation and grassing were also done, for example, at Reporoa in the pumice country and on fescue blocks in the Hauraki Swamp.) These works are still going on, in a highly-mechanised form. They have been the subject of strong criticism at times, but have added greatly to the total wealth of the country. The Hauraki Swamp scheme, for instance, brought 90,000 acres into production and gave rise to a new county, the Hauraki Plains County, while on the old Rangitaiki Swamp the Rangitaiki Plains Co-operative Dairy Company's factory has now one of the biggest butter outputs in the industry (about 5000 tons). It was from the Rangitaiki scheme that the Land Drainage Branch moved into the new field of development operations authorised by the Land Laws Amendment Act of 1929—the actual preparation for settlement of new farmland on Onepu Block, inland from the main swamp.

At left—Pasture land prepared by the Lands Department from scrubland, deteriorated land, or backward land is cut up into family farms which are leased or sold to ex-servicemen. Results are quicker and more spectacular on ploughable country, of which about half a million acres remain to be developed. Part of the Matanuku Block, near Tokoroa, which was cut up in 1945, is shown.

"Weekly News" photo.

Scrubland Development

The traditional, successful, independent method of pioneer settlement in New Zealand left, as a reaction to its own success, a strong opposition to any form of State interference with the pioneering spirit. This opposition persisted for some time after the scope for pioneering had been considerably reduced by the occupation of all of the lowland tussock and bush land where the accumulated fertility of the soil was virtually a liquid asset to the settler.

However, land development was a suitable means of meeting the demands of the unemployed for useful occupation, and the claims of would-be settlers desiring new land had to be recognised. Consequently the improved-farm settlement system was instituted in 1894 to find work for the unemployed. (4) Under that system blocks of Crown land, mostly bush-covered, were developed by groups of men employed either on wages or on the co-operative contract principle in making roads, clearing and burning bush and sowing grass. In most cases the farms were selected or balloted for in their primitive state and allotted as soon as part of the block was suitable for occupation, money being advanced for further improvement and the erection of a shack. "Owing to the lack of suitable land," W. R. Jourdain commented, "the scheme could not be continued for more than a few years, but was an undoubted success at the time." (5)

About this time the land-settlement policy split into two distinct trends, one following the pioneering system with diminishing momentum until it came to a stop with the passing of the Discharged Soldiers' Settlement Amendment Act of 1923, the other following the improved-farm settlement system. The Acts legalising this latter trend were the Deteriorated Lands Act, 1925, the Land Laws Amendment Act, 1929, the Unemployment Act, 1932, the Small Farms (Relief of Unemployment) Act, 1932-33, and amendments, and finally the Servicemen's Settlement and Land Sales Act, 1943, and amendments. (For a discussion of these Acts and their purposes and effects see "The New Zealand Journal of Agriculture," vol. 71, 1945, pp. 11 and 255.)

Contemporaneous with the beginning of the land-drainage schemes was the development of topdressing in the Waikato. Topdressing was the key to the efficient management of the estates acquired by the Bank of New Zealand Assets Realisation Board after the bank crash in 1895. Among the directions issued by the Commissioner of Crown Lands to applicants for sections on the Matamata and Selwyn Settlements between 1904 and 1907 was the following:—"24. Standard manure equal to not less than 1cwt. of bone-dust and 1cwt. of superphosphate per acre shall be applied to every crop, **and to land laid down in permanent pasture,** excepting in case of a crop following one eaten off the ground."

Matamata and Selwyn Settlements comprised about 130,000 acres; the Selwyn Settlement included part of the Tokoroa (or Patetere) Plain and the Mamaku (or Patetere) Plateau, which were cattle sick. Here not phosphate, but the trace element cobalt, was the limiting factor. The tantalising and heartbreaking consequences of cobalt deficiency in the pumice country drew the Lands Department into close collaboration with the Department of Agriculture that lasted until 1932 and influenced the development of the gumlands and the reverted King Country lands as well. The Department of Agriculture's Division of Fields and Experimental Farms established a demonstration farm at Mamaku, where the Department's chemist, B. C. Aston, conducted his long series of experiments with bush sickness that resulted in his discovery of the limonite remedy which made pumice-land development feasible.

Aston was extremely attracted by the pumice country. He wrote that "the climate may be claimed as one of the best in the world, and although the rainfall is high, the water gets away remarkably quickly through the porous soil, so that except in one respect this country is an ideal one for both man and animals." (6) Aston was primarily a soil chemist, and the arousing of his interest in bush sickness was incidental to his one-man soil-survey expeditions. He believed that pumice could be turned into good agricultural soil by the incorporation of humus through phosphatic fertilisers, leguminous plants, and stock droppings. He stated that the complex organic acids of humus would actually decompose pumice and dissolve out most of the plant food (7), but this theory was purely academic as long as cobalt deficiency was the limiting factor.

Among other public servants who shared Aston's enthusiasm for the pumice country were two successive Chief Drainage Engineers, J. B. Thompson and R. G. MacMorran, each of whom eventually became Under-Secretary for Lands. Thompson was Under-Secretary when the Land Laws Amendment Act of 1929 was passed, and he was largely responsible for the idea that the Crown should undertake the development of ploughable scrubland. MacMorran, who engineered the Rangitaiki Swamp scheme, was the first Superintendent of Land Development to be appointed in Auckland, combining the office with that of Chief Drainage Engineer.

In 1919 the Department of Agriculture began to break in an area of gumland at Puwera, near Whangarei. T. H. Patterson, who was the officer in charge, tried various methods before settling on that of perennial ryegrass-paspalum-white clover permanent pasture maintained by lime and superphosphate. He began with a combination of fascine draining and green manuring; tried a promising pasture mixture of kikuyu grass and *Lotus major*, and even indulged an ingenious theory of mixing in the soil ground rock phosphate with sulphur and a sulphur-oxidising bacillus, the theory being that the bacillus would oxidise the sulphur to sulphuric acid, which would convert the rock phosphate to superphosphate.

However, by 1925 Puwera was carrying a cow to 3 acres, after a cost of between £45 and £60 per cow, and with the carrying capacity actually still building up to a cow to 2 acres. At current values £60 per cow allowed a safe margin for dairying.

Patterson's report in 1925 uncovered the remaining obstacle to scrubland development, namely finance. He wrote: "The chief difficulty for the utilisation of these lands for farming is clearly one of finance. Looked at from the viewpoint of the individual prospective settler, this difficulty is very real. He would require too much initial capital to face the work unaided. . . . He would require from £1500 to £2000 to break in a sufficient area for running a herd that would support him. Obviously, therefore, it would be more a matter for the State or for private enterprise on a considerable scale to bring the land into profit, when settlers could take it up and make a living off it. . . ." (8)

Patterson's suggestion that the State might intervene was not as far-fetched as it appeared to be, for the pioneering diehards in the community had recently lost their footing in two catastrophic statutes, namely, the Discharged Soldiers' Settlement Amendment Act of 1923 and the Deteriorated Lands Act of 1925. Both of these Acts resulted in huge remissions of the capital indebtedness of settlers to the Crown and encouraged disbelief in the infallibility of orthodox finance.

The Deteriorated Lands Act dealt mainly with reverted and abandoned Crown leasehold sections in the King Country, where farming had been financed on the assumption that the land was similar to the rich soils of the Taihape district. The net returns were too low to prevent the reversion to scrub and bracken which resulted from a complexity of causes—high debt charges, high rainfall, poor burns, light land, cheap seed, sporadic bush sickness, the ingress of ragwort and blackberry, and the running of dairy cows rather than sheep and cattle.

On behalf of the Lands Department the Department of Agriculture established experimental areas where the biologist A. H. Cockayne and his assistant, E. B. Levy, made their famous studies on plant ecology that have had a profound influence on hill-country farming. After that work Levy went on to select the first strain of Certified perennial ryegrass, which was to be one of the keys to successful scrubland pasture establishment.

Among the most interested observers of the ecological investigations were —. Page, of the Public Works Department, and A. B. Jordan, a Government valuer, whose opportunity to exploit the new knowledge on behalf of the Te Kuiti district was provided by the Unemployment Relief Act of 1932 and the Small Farms (Relief of Unemployment) Act of 1932-33. Jordan was appointed superintendent of Land Development in Te Kuiti in 1933.

LAND DEVELOPMENT BRANCH

By 1928 the threads leading to the entry of the State into organised land development were ready to be tied. In that year the Rotorua-Taupo Railway Committee of Enquiry recommended the development of 10,000 acres of pumice land by the State, and in 1929 the Lands Development Board was constituted under the Land Laws Amendment Act. The board consisted of the Minister of Lands, the Under-Secretary for Lands, the Permanent Head of the Department of Agriculture, the Financial Adviser to the Government, and J. R. Franklin, farmer, of Wanganui. The board set up three advisory committees, one for North Auckland and two for South Auckland, each consisting of the respective Commissioner of Crown Lands and two notable farmers.

The first sites for development having been chosen, the Department of Agriculture was instructed to begin operations, the Fields Division starting on 8200 acres of pumice land at Ngakuru, near Rotorua, early in 1930, and the Horticulture Division on 1750 acres of black wattle country at Te Kauwhata, in the lower Waikato. Later in the same year the Land Drainage Branch began the laying down of grass at Onepu, a manuka swamp block of 3400 acres near Te Teko, in the Bay of Plenty. The scheme gathered momentum, and by 1931 the following other blocks were under way: Wharekohe, 3700 acres of gumland near Whangarei; Koromatua, 833 acres of swampy clay near Te Aroha; Reporoa, 3215 acres of various unlet pieces of swamp and pumice throughout the settlement; and Tapuwae, 3350 acres of pumice bush country on a high tableland near Te Kuiti. Grassing experiments were also begun on pakihi land near Westport.

Meanwhile the financial depression was developing and unemployment was becoming a serious problem. Both the Lands Department and the Public Works Department saw in land development scope for useful work for large numbers of the unemployed, but there was rivalry over administration of the schemes. The Department of Agriculture, after differences of opinion over the suitability of Galatea Block (22,325 acres) for intensive development, withdrew altogether from land-development operations in 1933. In that year the Small Farms (Relief of Unemployment) Act took precedence over the Land Laws Amendment Act, the settlement policy of the Small Farms Act being much less liberal than that of the Land Laws Amendment Act. Whereas Ngakuru and Te Kauwhata Blocks had been cut into sections of 150 to 200 acres, which were eventually mortgaged and freeholded, the standard for the Small Farms Board was a leasehold dairy farm of 50 to 75 acres, costing not more than £1200 unstocked, with a full carrying capacity of 30 to 35 cows. Such farms were strictly one-man units, neat and sound, but yielding little margin for luxuries.

From 1933 until about 1937 unemployment relief continued to dominate the land-development policy, and though many thousands of acres of grass (comprising an immensely-valuable asset and a source of much wealth) were sown, fenced, stocked, and consolidated, conditions for the workmen were generally hard, and as the depression ended they tended to drift away into better-paying jobs.

The scheme, however, was too well founded to be abandoned. In 1938 wages and conditions were somewhat improved; the Lands Department took over those blocks on which the Public Works Department was working, and also those of the Waikato Land Settlement Society (a philanthropic institution) and the field of operations expanded again until 1941, when stocks of fencing wire were commandeered

A Puwera farm developed from raw gumland by the Department of Agriculture between 1920 and 1930. It is now privately owned and in the 1947-48 season 83 cows grazed on 170 acres produced 2200lb. of butterfat, and in addition 300 store lambs were fattened.

by the Army. From then the blocks were gradually drawn into the ex-servicemen's rehabilitation scheme, beginning with an amendment to the Small Farms Act in 1940 and culminating in the Servicemen's Settlement and Land Sales Act of 1943. The Lands Development Board and the Small Farms Board were both abolished in 1941 and replaced by the Land Settlement Board.

The Land Settlement Board's present policy is that approved by a Select Parliamentary Committee, which was appointed in 1942 to investigate charges of extravagance made against the Lands Department during a Parliamentary debate on the National Development Loans Bill. In its report it said: "During depression years development was undertaken chiefly as a means of providing productive employment for unemployed labour, and it naturally followed that the use of machinery was restricted to a minimum in order to provide as much manual work as possible for the surplus labour available. The Committee, however, considers that the work is of such importance that in any future operations full advantage should be taken of the use of efficient plant, including plant belonging to private contractors, which besides being more economical than manual labour, also enables the more expeditious handling of the various types of work involved. . . . It must be accepted that most of the land being developed cannot be brought to a fully-productive stage at a cost upon which farming activities can be made profitable, and a writing down to a fair value will be necessary. . . . The history of land settlement in New Zealand shows how successive Governments have had to assist settlers continuously by way of concessions in rent, interest, and capital charges, and even then many have failed and wasted the best portion of their lives in an endeavour to break in and make a farm. . . . If a settler is established on a fully-developed farm, and farms it in accordance with the established rules of husbandry for the district, he has only to look to his own personal efforts to be a successful farmer." (1)

The freehold was restored by the Land Laws Amendment Act, 1944, but it was not unrestricted freehold. The sole mortgagee was the State Advances Corporation, without whose consent properties could not be transferred.

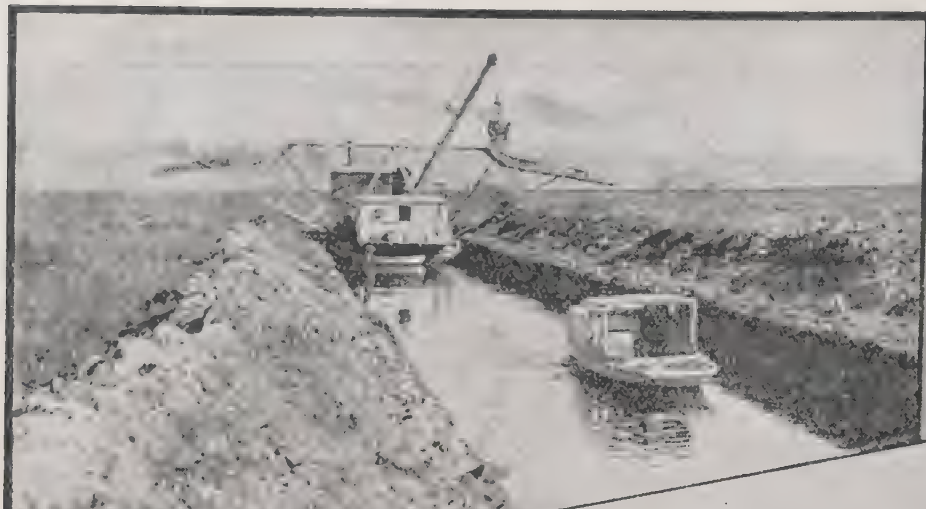
Soldier Settlement Schemes

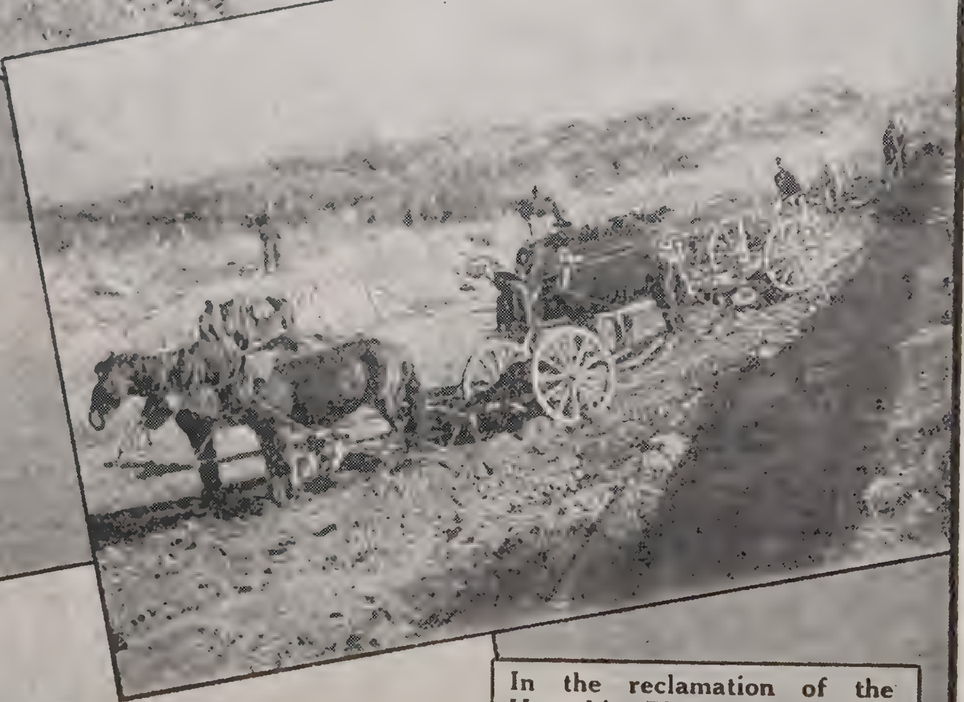
The three wars in which New Zealand has been deeply involved—the Maori Wars and the First and Second World Wars—have been followed by soldier settlement schemes. The Maori Wars were land wars, but the conquered lands were allocated to militiamen and officers in sections of 40 to 400 acres according to the military rank of the settler, not according to the quality of the land. Settlement was more successful in Taranaki, where the land was good, than in the Waikato, where the land was poor. Speculation helped to defeat the scheme in the Waikato; Brett's Almanac of 1890 said that "at the present day we should think that there could not be found in the district one hundred families of the original settlers. The men of the various regiments left almost immediately, for the most part selling their scrip to merchants and others in Auckland, and these in turn sold again, in some instances to the present settlers." The new purchasers aggregated the titles into farms of 250 to 1000 acres.

Under the repatriation Acts of the First World War—the Discharged Soldiers' Settlement Act, 1915, and the Discharged Soldiers' Settlement Loans Act, 1919—nearly 10,000 men sought farms, and of these 4000 were settled on 1,400,000 acres opened for selection as Crown blocks and the remainder on single-unit sections negotiated mainly by open-market purchases. The settlers were assisted by loans of up to £1500 on current account and up to £2500 for the purchase of land. The natural post-war land boom was thereby greatly inflated, the total value of land transactions going from £13 million in 1918 to £54 million in 1921 and back to £15 million in 1923, and the average price per acre from £6 14s. to £11 19s. 6d. and back to £6 14s. 6d.

The Commissioners of Crown Land at first tried to provide improved farms for settlers, but in the excitement of the boom the situation got out of hand; local bodies, chambers of commerce, patriotic societies, and the Press insisted that unoccupied and unused land should be made available to settlers and the Commissioners were forced to capitulate. A noted agricul-

RECLAMATION AND DRAINAGE OF HAURAKI PLAINS





Above — Dredging the Ngarua Canal.

Right—Road formation on the Waitoa Block.

Below — Metalling a new road.

In the reclamation of the Hauraki Plains the Land Drainage Branch of the Lands and Survey Department stop-banked and dredged the rivers of the basin; two extensive diversions of the Piako River were made and its channel widened; three main drainage canals, the Maukoro, Awaiti, and Ngarua, were constructed, and subsidiary drains and stop-banks to carry the drainage water out to canals and rivers. Roads necessary to open up the area for settlement were also constructed.

[Reproduced from annual reports of the Lands Department 1912, 1914, 1915.

tural editor, Frederick Carr Rollett, while lending his pen to the campaign, urged that the scrublands of the Auckland Province should be developed into fully-improved farms by the State, and made a remarkably-detailed forecast of the present Land Development Branch (9); but he was some years ahead of his time.

The Lands Department made an attempt to steer the situation along the old improved-farm settlement lines, the following excerpt from its annual report being published in "The New Zealand Journal of Agriculture" in 1919: ". . . There is a tendency amongst some of the soldier settlers to rely too much on outside labour to do the work for which the Government advances have been made, instead of doing it themselves wherever possible, as 'improved-farm' settlers would do. This should be discouraged, or the soldiers will soon find themselves at the end of their resources. . . . With labour so dear the money that may be advanced will soon fritter away, and the soldier with very little experience and no money will not be able to make the best use of the grass he has grown by contract labour."

Circumstance, as usual, settled the argument. The short, sharp, post-war slump set in in 1922, and in 1923 Parliament passed the Discharged Soldiers' Settlement Amendment Act to provide relief. Inquiries revealed that 800 farms had failed and another 1300 were losing money. A Dominion Revaluation Board with 24 district committees was set up, and by March 31, 1925, had made reductions of valuation in 5284 cases. The chairman's report in 1925 concluded as follows:—". . . The reductions made by the Dominion [Revaluation] Board should not be taken as in any way reflecting on the wisdom of those recommending the several purchases, but rather as an earnest endeavour to readjust values to co-ordinate with the altered conditions of today, offset the late slump, and be in line with the productive value over a series of years. The reductions made by the board, it is submitted, are really the cost of repatriation, and the country has reason to be satisfied with the success of its effort on behalf of those who left the Dominion's shores to fight for their people and country." (1)

Nevertheless, the lessons of the past and the experience gained in the land-development operations of the succeeding 20 years considerably altered the rehabilitation scheme of 1943 from the repatriation scheme of 1915.

For the settlement of ex-servicemen of the Second World War it was generally agreed

(a) That the farms should be "improved farms;" that is, that there should be no doubt that they could be successfully worked under individual occupation;

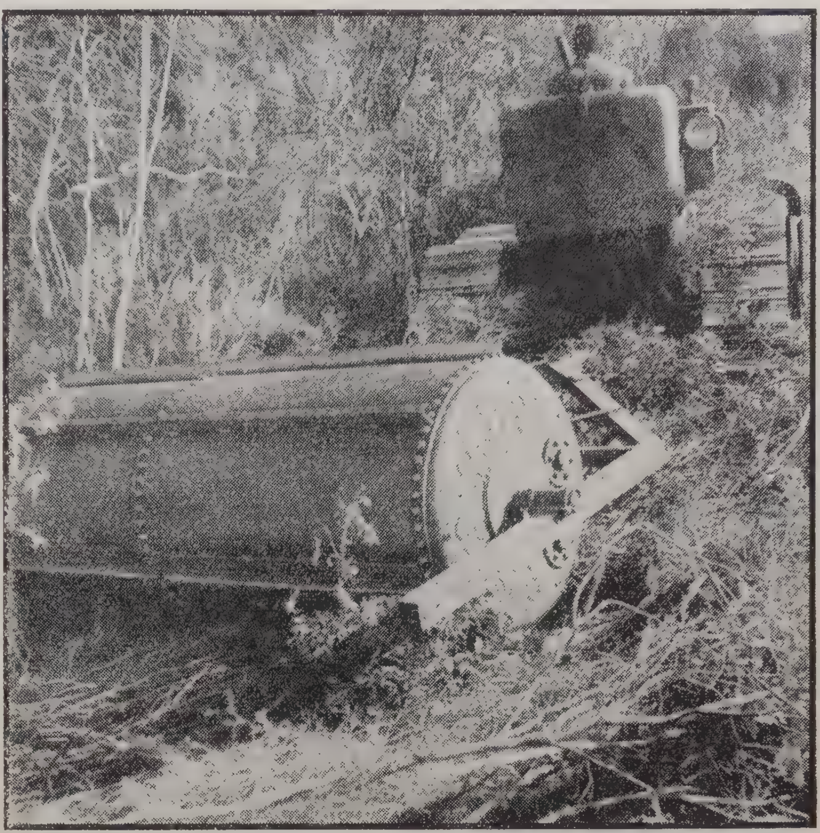
(b) That the housing should be up to a good suburban standard;

(c) That the holding should be economic, not too large or too small;

(d) That finance should be adequate and its expenditure supervised;

(e) That the applicants should be graded according to their knowledge and experience; and

(f) That speculation should be prevented.



["New Zealand Farmer" photo.

The first step in developing scrubland is to get rid of the scrub. If scrub is turned under, the seed-bed will not settle down properly. Scrub must be killed by cutting or crushing and then burnt. As cutting is expensive and slow, the Lands Department devised the roller shown above from an old boiler with the steam holes welded up. When filled with water the roller weighs about 7 tons. The cleats give it a lurching motion which helps to break up the scrub. The roller is more manageable on gritty pumice than on greasy clay.

A Farms Advisory Committee was appointed to direct the policy on all points except the last, which was directed by the Land Sales Courts. Farming sub-committees were set up in different districts to grade the applicants and arrange for the "B" and "C" gradings to raise their grade by extra experience on suitable farms. Grade "A" applicants could ballot immediately for the available farms in their district by drawing a numbered marble from a box. The supply of farms was delegated to the Rehabilitation Loans Committee (for single-unit properties) and the Land Settlement Board (for properties requiring subdivision). The economic unit was based on the following standards:

Dairy farms, 8000 to 12,000lb. of butterfat.

Sheep farms, 600 to 1000 breeding ewes.

Mixed farms, 400 breeding ewes and 40 acres cash crop or butterfat equivalent.

The Farms Advisory Committee, reviewing the progress of settlement at the beginning of the current season, estimated that the total settlement on settlement blocks and on existing economic single units purchased with rehabilitation loan finance would reach 5600 by the end of June, 1948, and that a further 1000 men would be settled during the succeeding year. Present indications are that the estimated settlement for this season will be achieved. At March 31, 1948, according to the annual report of the Rehabilitation Board for 1948, a total of 5158 men had been settled on the land with rehabilitation assistance.

LAND DEVELOPMENT BLOCKS

In August, 1947, when this survey of development blocks was made, spick-and-span farms in groups of 2 to more than 20 were becoming sufficiently numerous in the North Auckland and Auckland Land Districts to attract the attention of travellers.

The Te Kuiti and Auckland Land Development offices between them controlled more than 100 blocks ranging in size from about 300 acres to about 30,000 acres. Neither the number nor the acreage was fixed, but fluctuated continuously in consequence of the acquisition and disposal of land. A few of the blocks appeared to be more or less permanent property of the Lands Department, but only on account of some factor, such as convenience as a reservoir of cattle or the immaturity of pasture, which postponed their subdivision. In the sheep returns for 1945 the Lands Department was shown as owning 158,000 sheep in the Auckland Province, with which must be included cattle in proportion, these stock being shifted round from block to block during the course of development. In earlier days stock were bought and sold on the open market, and the Department's buyers, in order not to influence the market unduly, had to operate over long distances and at considerable expense. Posts, battens, and bridge-stringers were supplied as far as possible from the Department's own bush blocks.

In the offices were the superintendents and their agricultural and livestock supervisors, civil engineers, surveyors, draughtsmen, and clerks. The Te Kuiti office also had its own housing department. In the field were the overseers of groups of blocks, the managers of individual blocks, stockmen, tractor drivers, fencers, drainers, scrub cutters, and storemen. Contact between the blocks and the offices was maintained by periodical visits by administrators in both directions. The scale of the enterprise is given by the 1947 report, which shows receipts of £995,000 and a Parliamentary vote of £2,000,000.

The supply of land for development had three sources: 1. Crown land; 2. Land purchased from private owners by the Land Settlement Board, and 3. Land acquired compulsorily under the provisions of the Servicemen's Settlement and Land Sales Act for the settlement of ex-servicemen. The prime essentials of development were the provision of good water and pasture. The provision of water was an engineering problem which was solved according to the circumstances. Pastures were established almost invariably on some modification of the surface-fertility theory. The blocks, which were selected after consultation between the Commissioners of Crown Land, the Land Development supervisors, and the Farming Sub-committees, and approved by the Land Settlement Board, were given priority ratings according to the demand for farms, the stage of development, and the supply of materials. Each block was given a name, usually after some local feature or neighbouring township. When huts and sheds were erected men and machines moved in and the jobs were got under way.

[*"New Zealand Farmer" photo.*

After the clearing off of the scrub the land is ploughed for a seed-bed. Lands Department cultivation aims at establishing permanent pasture on the first ploughing by careful working, heavy manuring, and the use of Certified pasture seeds.

Eventually the farms were handed over to the State Advances Corporation and the settlers as going concerns at prices determined by valuation. Usually the settlers had worked as sharemilkers or employees of the Lands Department for a year or so, often assisting in the development operations as well, and had broken in the herds. The flocks and herds were provided by the Lands Department as far as possible from its own breeding blocks, and for the first year or two were culled at its own expense. The number of dairy heifers bred by the Department is of course not large, the remainder being bought in; of these, however, some are reared on development blocks.

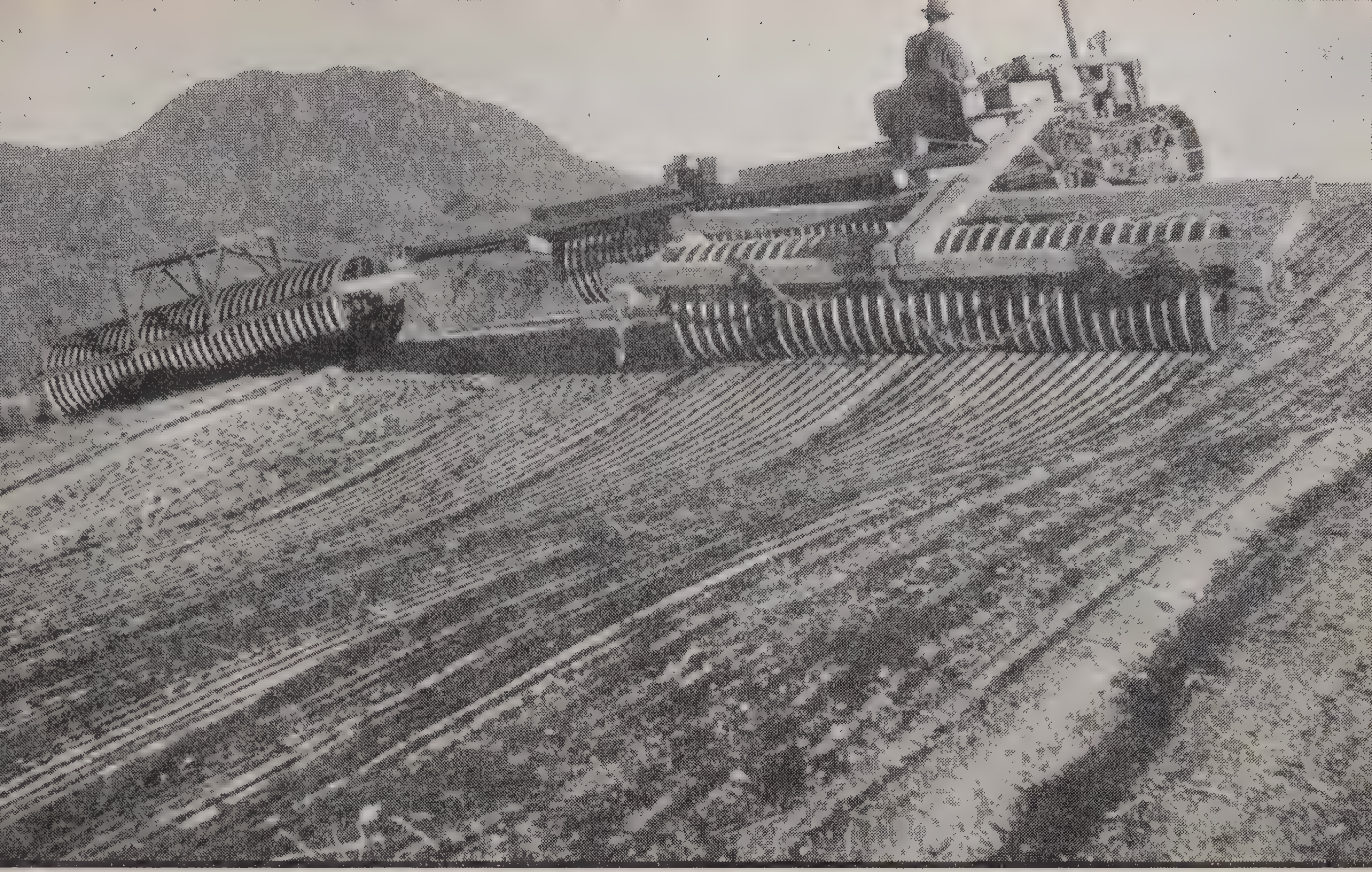
Early in 1944, after discussions between the New Zealand Dairy Board and other interested Government Departments, a scheme was inaugurated under which the New Zealand Herd Improvement Association sponsored the interest of the farming community in the rearing of calves. The Herd Improvement Association each year circularised its members, impressing on them the need for rearing calves from tested herds to provide dairy stock for ex-servicemen settlers.

Details of calves made available are supplied to the Lands Department, whose field officers undertake inspection and valuation of the calves. At an agreed date these calves are collected by the Lands Department and are subsequently grazed on the Department's land development blocks until they are allocated to ex-servicemen dairy farmers.

The scheme has proved a success since its inception, and the number of heifers and bulls required for ex-servicemen settlement has been filled each season. The numbers so far purchased under the scheme have been as follows: 1944-45, 2083; 1945-46, 1607; 1946-47, 1587; 1947-48, 2000 (minimum estimate).

The methods of scrubland development used are in general those devised by the Fields Division of the Department of Agriculture in the decade 1920-30. These in turn were based not only on the discoveries of the research workers whose names have been mentioned, but also on the experiments of pioneer farmers, many of whose names appear in the historical and statutory records listed at the end of the article. It is beyond the scope of the article to pick out individuals for special mention, but, as B. C. Aston wrote in 1931 concerning his bush-sickness investigations, "in troubles which are common to large areas of country there are bound to be some farmers who may hit on the right method of treatment or suggest it, and yet on account of having no backing from scientific authorities they neglect to persevere in the application of any particular idea." (12)

Four kinds of land are available for settlement—virgin scrubland, deteriorated land, backward land, and improved land. In the first category are the unoccupied downs and plains of North Auckland and the pumice country. The second is composed chiefly of hilly sections which have gone back to fern and manuka, but includes some easy country where such weeds as tall fescue, blackberry, ragwort, or rushes have taken charge.



[*"New Zealand Farmer" photo.*

Preparation of the seed-bed is of prime importance, the method varying according to the type of soil. Gum soil needs loosening, pumice soil needs firming, but the final result is the same—a fine, firm seed-bed with no break in the moisture film between topsoil and subsoil. Shown above is the final rolling on the Maraetai Block. The first rolling was done on top of the ploughed ground. The ground has been winter fallowed, disced, harrowed, and levelled.

The backward land is chiefly that which, because of insufficient capital or because the sections were too big, has not progressed in the same way as the rest of its district. The fourth category is composed of land recently acquired for providing farms with as little delay as possible; as long as materials and labour are in short supply this kind of land is of disproportionate importance.

In describing the methods of development 16 of the 100-odd blocks, totalling about 65,000 acres, will be referred to.

Virgin Scrubland

Scrubland development follows the surface-fertility theory, by which the top inch or two of soil is made fertile enough to sustain a vigorous ryegrass pasture on a virgin seed-bed.

On gumland the preparation of the seed-bed is the stumbling-block. Because of the absence of frosts, the stiff clay does not weather down, but has to be worked down. It is broken up with discs or short-breasted mouldboards in the autumn, fallowed over the winter, ploughed more carefully in the spring, worked down during the summer, and sown by the middle of March. "The two ploughings give an excellent seed-bed; the bottom is firm and moist, firm with natural consolidation, and this firm and moist bed allows of early sowing, and a good grass and clover cover is secured before the winter; and the first grazing can be done before the land is really wet." (10) One ton of crushed limestone to the acre is sown during cultivation, 3cwt. of superphosphate or serpentine superphosphate with the seed, and another 3cwt. of phosphate in the following spring. The calcium and phosphorus stimulate the young clover plants and their symbiotic bacteria, nitrates accumulate and nourish the grass roots, animals contribute their lot, and the nitrogen cycle gets into full swing.

The process is complicated on gumland by the rough nature of the surface and the shortage of good water for stock. The bulldozer is the ideal implement for levelling the ground. About 250,000 acres of undulating gumland can be developed if water can be provided. **Mangawai Block**, 1862 acres of the Mangawai kauri gum reserve, was for the most part typical gumland, pitted with holes and covered with gorse, manuka, and hakea, but it ran down into a coastal swamp, and water could be got by boring. Begun in 1939, 1200 acres were broken into grass for the Small Farms Board, 227 chains of main drain were excavated, shelter belts planted, and boundary fences erected, but the war intervened and the block was kept for ex-servicemen's settlement. Pastures deteriorated through summer droughts, lack of fertiliser, and stocking with sheep. The block was subdivided into 8 dairy farms in 1947 and houses and buildings erected, but settlement was held up pending improvement to the pastures and reticulation of power.

Virgin pumice-land development is typified by Tokoroa and Maraetai Blocks, where the surface-fertility theory again prevails. The same heavy manuring is done, but one shallow ploughing, which can be done at any time of the year, and even in the rain, is all that is necessary. No lime is needed. A winter fallow is preferred, but is not essential. Sowing can be done in spring or autumn, but autumn is safer. The preparation of the seed-bed invariably involves several rollings, the first time on top of the ploughing and the last time on top of the seed. Pumice flats are often undermined by dry watercourses into which the ground may suddenly collapse when the topsoil is disturbed. Such subsidences are known locally as "tomos," from the Maori word for cave. Summer frosts can damage or destroy crops of potatoes, maize, tomatoes, beans, and pip fruits on an average of about 1 year in 3. Good water is plentiful; when not on the surface it may be readily got by boring. About 250,000 acres of pumice land await development.

Tokoroa Block (5201 acres) was an education endowment reserve surrounded by proprietary pine plantations. A timber company's railway ran through it. Development was begun in April, 1938. Points were inserted in the railway line and a siding taken off, alongside which a large manure and seed store was erected. In the middle of the block, beside a flax swamp, a camp was established, with stables and implement sheds and a timekeeper's office. A road was graded out of the pumice dirt between

Just a handful of grass seed

. . ***but*** it means much to the productive capacity of your farm. Be sure it's right, because good land and hard work count for little in the establishment of a high-producing grassland sward if a poor pasture mixture is sown or cultivation is inefficient.

NOW is the time to plan early cultivation to obtain that fine but firm seed-bed. Early cultivation should be deep and thorough, finishing off just before sowing with a light harrow and the roller. Plan the grass seed mixture carefully and ensure that—

1 *The species included are suitable to the district and area to be sown.*

2 *They are of high-producing strains and, where possible carry Government Certification.*

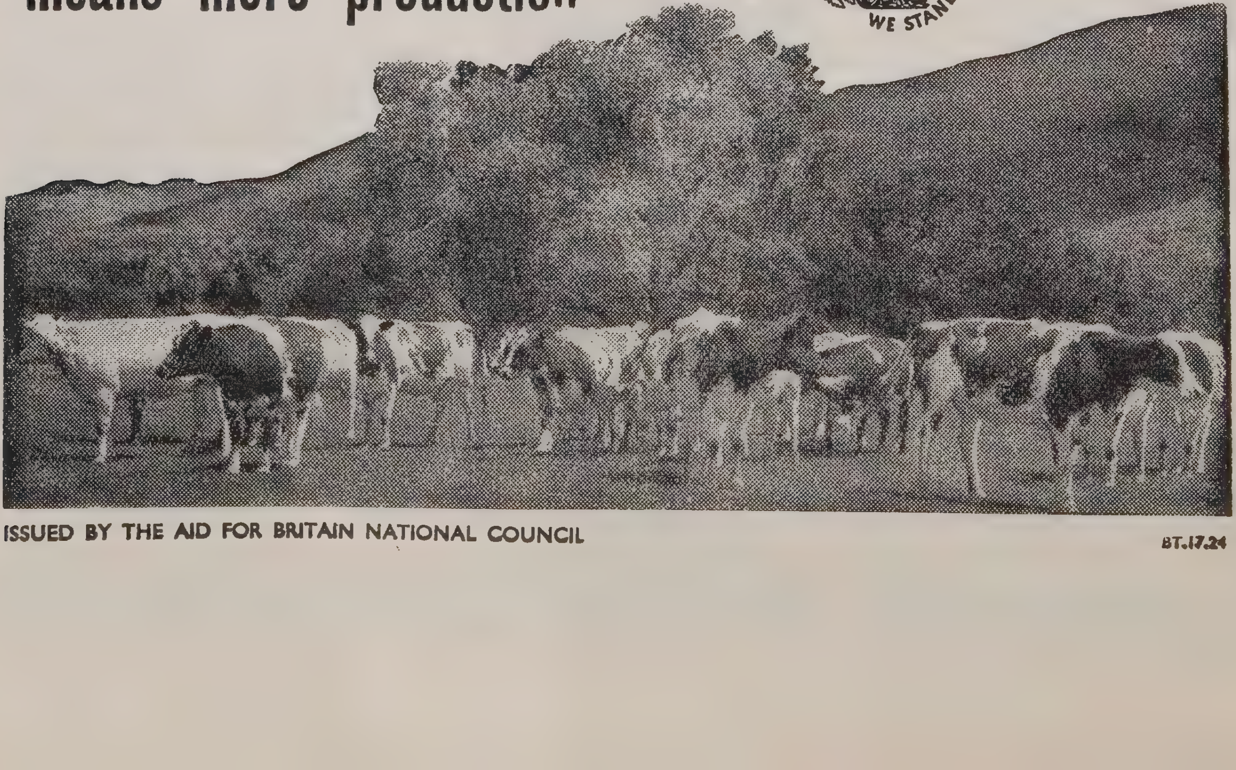
3 *The germination and purity standards are satisfactory.*

4 *No seed of the "cheap seed mixture" type is included.*

Efficient cultivation and a good grass seed mixture return handsome dividends.

WHERE BRITAIN STANDS WE STAND

BETTER FARM MANAGEMENT
means more production



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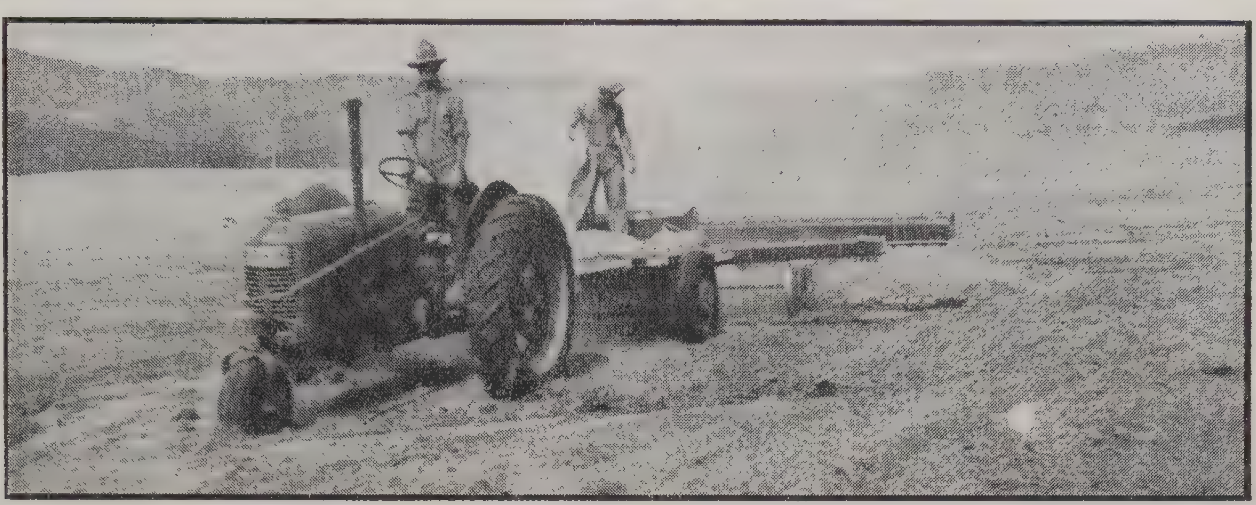

[*"New Zealand Farmer" photo.*

Seed was sown in March when dust was flying, and the first rains germinated it. Implements were hitched up in gangs —tractor, manure trailer, manure and seed spreader, brush harrows. The seed-bed was dry on top and moist underneath. Its firmness is indicated by the fact that the iron wheels of the spreader do not sink into it.

the siding and the camp, and beside it a manager's house was built. Men were brought in and given scrub-cutting and drainage contracts. The ground was cleared in sections of about 200 acres. When the scrub was dry it was burnt off under the supervision of forestry company officials. The flats were then ploughed with crawler tractors and 3-furrow ploughs; some of the sidlings were surface sown after the burns, but others were cultivated with reversible-mouldboard hillside ploughs and 2-horse teams. Seed was sown in spring or early autumn at the rate of 40lb. per acre with 3cwt. of cobaltised superphosphate and another 3cwt. 6 months later. Most of the sowing was successful, but some was wrongly timed and had to be repeated. On the surface-sown ground the red clover came away first and grew luxuriantly; on the cultivated ground the ryegrass came way first, then turned yellow through shortage of nitrogen, and was in turn dominated by a tremendous burst of white clover. By this time the sections, piped with water from the creek and ring-fenced with double fences and pine belts, were stocked with black cattle, by the manipulation of which a ryegrass clover balance was restored to the pastures, some of the cattle being lost by bloat. Swedes, mostly grown on a virgin furrow and hence rather woody, helped to winter the cattle; a lick of salt, boneflour, and limonite was put out in boxes, and on this diet, supplemented by Yorkshire fog and weeds in the gullies, the cattle showed a tendency to fatten.

In this manner development had proceeded about half-way when the war stopped it. The earlier sections, having passed their critical stage, came on very well. Cattle and sheep were bred on them, and large quantities of hay were baled for shipment to other blocks. The later sections, the surface fertility of which was not high enough, tended to run out to cocksfoot and "totara weed," with some invasion by broom.

Maraetai Block (5000 acres) is on the fringe of a big strip of Crown and Maori land, with a good aspect, which runs away south to National Park. It had no access until the hydro-electric schemes were begun in 1945. Development was begun in September, 1946, to provide farmlands handy to the new hydro settlements. Twelve hundred acres, sufficient for 8 dairy farms, were grassed 6 months later, manual labour having been virtually eliminated. The scrub was crushed with a 7-ton cleated roller made from an old dairy factory boiler filled with water and drawn by a 60 h.p. tractor. The crushed scrub was roughly burnt and the ground turned over by a team of crawler tractors drawing semi-swamp ploughs each turning two shallow 18in. furrows, with an extra large skeeth cutting below the furrow sole and a chain to drag the rubbish under. The ploughing was rolled flat with the big roller, its weight reduced to 2½ tons. Discing, harrowing, boarding, and further rolling prepared the seed-bed. The seed was sown in March when the dust was flying, the implements being hitched up in gangs. The strike was excellent.

Deteriorated Land

It is sometimes hard to distinguish between virgin land and deteriorated land. South of Maungatautari Mountain, for instance, is a large area of light land which remained only sparsely settled for many years. Its natural vegetation was fern, tutu, scrubby manuka, and heath. Until about 1930 ragwort spread unchecked throughout it, and to this extent it can be said to have deteriorated. It bordered the cattle-sick country, on the fringe of which some farms were abandoned.

In 1933 the Small Farms Board acquired **Ellicott's Block** of 2900 acres at the foot of the mountain. Sixty acres were in grass. Two hundred and fifty-eight acres of Crown land were subsequently added. The block was roaded and a camp was erected. The easier portion was cleared by hand, burnt, disced, and grassed, and the ragwort repressed with big flocks of dry sheep. When the pasture was consolidated two experimental herds of dairy cows were established, while the steeper portion of the block was burnt and surface sown. The block was settled with ex-servicemen in 1946 after some of the sections had been enlarged.

Galatea Block, about 25,000 acres in the valley of the Rangitaiki River, was a large sheep station when it was acquired for the Lands Development Board in 1931. It was reverting to manuka. Galatea turned out to be a special case of pumice development because of its peculiar loose subsoil. Moreover, shingle bars of greywacke from the bordering Urewera Mountains saved it from being generally cattle-sick. In dry summers the new pastures tended to die out and be replaced by the original association of chewings fescue and danthonia. The process of trial and error disclosed that milk production could be safeguarded through the use of lucerne as a grazing pasture, and this, adopted as standard practice for the district, has put dairy farming on a sound basis. Eighteen servicemen had been settled by the middle of 1947 and many more subdivisions were under way. The sections were of approximately 160 acres, with about 20 acres in lucerne. The district has a number of advantages, notably its healthiness for stock, especially pigs. Excellent crops of carrots can be grown. Pasture management consists of lenient grazing in the early summer so that the better species can go to seed.

Deterioration is, of course, a characteristic of high-rainfall hill-country rather than of easy country. Next to the immediate development of ploughable scrubland the reclamation of deteriorated hill-country will be the major function of the Land Development Branch. It is more laborious and therefore more dependent on the labour market. The aim is to secure a tight sward of those grasses and clovers whose nutrient requirements are very little higher than what is yielded by the constant weathering of the soil. Financial security and efficient livestock management are fundamental requirements. Topdressing is primarily a method of weed control; a little manure thrown into a patch of fern improves the flavour of the surviving pasture and entices the cattle in after it, whereupon the fern is crushed out and the pasture revived.

Piu Block, on the Te Kuiti-Taumarunui highway, was an amalgamation of Piu Settlement and 13 abandoned Crown sections surrounding the settlement totalling 6131 acres. The first of the sections came under the control of the Small Farms Board in 1935, the next four in 1937, and the remainder in 1939. Some of the country was very rough and broken, but with the burning of the fern, followed by surface sowing and heavy stocking, the picture of desolate waste was gradually changed. By 1941, 2150 acres had been regrassed and wintered 1500 ewes, 4800 dry sheep, 100 breeding cows, and 260 store cattle. During the war the pastures were kept clean, though rather bare, by the skilful manipulation of stock. Summer droughts and the grass-grub *Odontria* delayed their recovery, and the sections had not been resettled by the end of 1947.

Riverside Block (3967) acres was a run-down sheep station in a remote valley about 20 miles from Dargaville. Its topography varied from flat to steep, and its soils were the bewildering mixture of types so characteristic of parts of the peninsula. The bush-burn fertility was long since gone, the leaching process being so far advanced that only a few wethers could be fattened, while attempts to check the invasion of manuka by indiscriminate burning had so damaged the fences that controlled grazing was impossible. The block was acquired in 1946, and a programme of clearing, draining, fencing, cropping, resowing, liming, and topdressing was immediately instituted. Labour was so hard to obtain that a scrub-crushing roller of the Maraetai model was tried out on the lower paddocks, but proved to be less manageable on greasy clay than on pumice. It was expected that the block would be eventually subdivided into 4 sheep farms, each with about 250 acres of ploughable land.

Reversion to tall fescue often occurs on swamp land which is indifferently managed. This grass was extensively sown on river-flats for cattle feed about the turn of the century. The Lands Department, through its drainage operations, has had a good deal of experience with it; as far back as 1921 the Department was ploughing it under with motor-tractors on the Hauraki Swamp. At **Awaroa Block** on the old Tokatoka Swamp (now the Ruawai dairy district) the Department has recently converted 287 acres of fescue land into 3 dairy farms by the same method, with the addition of a smothering mixture of 50lb. of Certified pasture seed sown on top. These farms were also provided with a winter run-off on the hills near Matakohe.

Backward Land

In those districts where farming, after languishing for a time, has suddenly advanced as the result of some new discovery or application of human ingenuity, there are often blocks of land which lag behind the rest. Sometimes the same kind of lag is due to changes in the life of society; for instance, a rise in the standard of living may render unprofitable the development methods of the previous era.

The Tokoroa district leaped ahead after the discovery of the limonite remedy for cobalt dificiency. In 1940 the Land Purchase Board bought several sheep sections from various owners, including the Matarawa Land Company (a company well known for its pioneering work in the district), and combined them into the **Matanuku Block** of 3402 acres. The block was reconditioned for dairy farming during the war with the help of conscientious objectors, a defaulters' camp being established on the back boundary. It was settled in 1945, having been cut into 22 dairy farms averaging about 130 acres and a sheep farm of 480 acres, with 60 acres of reserve round the old homestead and stream. The dairy farms run a few sheep for ragwort control.

On the west coast of North Auckland there is a soil type, the coastal sandy loam, whose progress from dry-sheep farming to dairying has been brought about by topdressing.

In between the era of indiscriminate bush burns and the present era of forest conservation there was a short period when easy land that had been cut over for timber was available for settlement. However, times had changed, and settlers could no longer afford to wait until the stumps and logs slowly rotted and the land became ploughable. In 1930 a timber company sold 3328 acres of high pumice tableland near Te Kuiti, with a camp on it, to the Lands Development Board. This was **Tapuwae Block.** The stumps were blasted, logged up, and burnt, and the block converted into a breeding run for sheep and black cattle. On **Ohakune Block** (1087 acres) and **Raetihi Block** (3135 acres) the Public Works Department collaborated with the Lands Department in similar operations, eventually using bulldozers to push the timber into windrows, where it could either be burnt or left for shelter. The soils of Ohakune and Raetihi Blocks are rich-brown loams of the kind favoured for market gardening. The land was disced, then cropped for swedes, then for chou moellier, and

[*"New Zealand Farmer" photo.*

The final stage in pasture establishment is early grazing management. Ryegrass comes away first, but soon turns sickly because of lack of nitrogen. A second phosphate topdressing in spring brings on a tremendous flush of white clover which supplies nitrogen but must be eaten down to prevent its dominating the sward. Grazing with beef cattle gives a balanced sward of clover and ryegrass and in the second year the pasture is suitable for dairying.

ILLUSTRATION ABOVE: Settlement on the Matanuku Block, Tokoroa, in May, 1947. Photograph by "Weekly News."

finally ploughed and sown to grass in spring. Spring sowing was necessary because of the damage done to young clover plants by autumn frosts. The blocks have been used as reservoirs of stock which were shifted on to newly-developed land on other blocks for pasture and weed control as required. Ohakune was settled in 1946 as mixed sheep and dairy units. Raetihi was used as a Services' Vegetable Farm during the war; afterward it was re-grassed and by 1947 was almost ready for subdivision.

Improved Land

The Servicemen's Settlement and Land Sales Act provides land for quick settlement. Properties suitable for subdivision are administered by the Lands Department. While labour and materials are in short supply this kind of land tends to get disproportionate attention, but the supply is strictly limited.

Putiki Block (1549 acres), on the Rangitaiki Plain, until recently was farmed by 7 sharemilkers, each with a separate herd. The property appeared to be too big for efficient management; the pastures had deteriorated and turned rushy. When the block was purchased for ex-servicemen some of the pastures were renewed, the whole block was given a ton of lime to the acre, and new fences were erected to provide 14 farms.

Waikuku Block (1053 acres, 10 dairy farms) and **Paratu Block** (2029 acres, 16 mixed farms), near Morrinsville, are reminders of the time when all that rolling clay country was suitable only for mixed cropping, the pastures running out to chewings fescue after 4 years. The development of topdressing at Cambridge and the success of basic slag at Ruakura were the factors which made all-grass farming feasible and made Morrinsville one of the richest country towns in New Zealand. Waikuku and Paratu, when acquired for settlement, were not up to the standard of the district, and development was based on adequate topdressing and subdivision, with the expected result.

Away up in the north of the North Island, on the lower slope of Ahipara Bluff overlooking Ninety-mile Beach, is **Lake View Block** (796 acres, 2 dairy farms). The lake is in the middle of the Kaitaia Swamp, into which the farms extend. Lake View is interesting for the presence of the kikuyu grass in the pastures. Kikuyu, a frost-tender stoloniferous twitch, was introduced from Rhodesia by the Department of Agriculture on its gumland experimental farms about 1920. The lesser birdsfoot trefoil (*Lotus hispidus*) had been discovered by pioneer settlers to be a suitable legume for untopdressed gumland, and the combination of trefoil and kikuyu was considered to be of great promise. Farmers from all over the peninsula took cuttings of kikuyu for planting, as did the Public Works Department for the consolidation of road and railway embankments, but its entry into ryegrass pastures caused much controversy. At present it has to be regarded for better or for worse as a companion to paspalum, whose winter dormancy is a drawback for which kikuyu helps to compensate.

HOUSING ON EX-SERVICEMEN'S SETTLEMENT FARMS

THE settlement scheme formulated for returned soldiers of the First World War did not provide housing accommodation on the sections of selected land. The soldier settlers had to arrange their own living quarters and up to £150 was advanced for the erection of a dwelling ("The New Zealand Journal of Agriculture," vol. XIV, p. 422). Though prices and supplies of building materials were much easier then, the stipulated amount of the loan could hardly be considered sufficient to build a farm house or even a cottage of any great degree of efficiency or comfort.

Numbers of settlers lived at first in tents, converted wool or implement sheds, and workers' huts; some put up buildings which were little more than shacks or whares, and a big proportion of these men had merely the bare necessities of shelter and a place to eat and sleep. Frequently the shacks were of two rooms, with a lean-to or low gable roof, and were intended to become the rear portion of a house which would be completed when the farm had been improved and the settler was in a sounder financial position.

Some of these dwellings have been altered and improved out of all recognition and have become reasonably-comfortable homesteads; others have "grown" in the most obvious fashion, sprouting additions in every direction, and are now serviceable but inconvenient; others have had bathroom, laundry, and extra bedrooms added,

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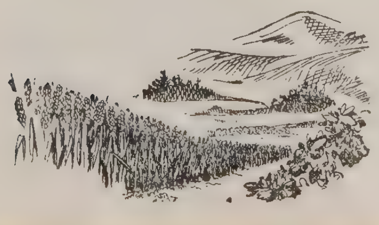

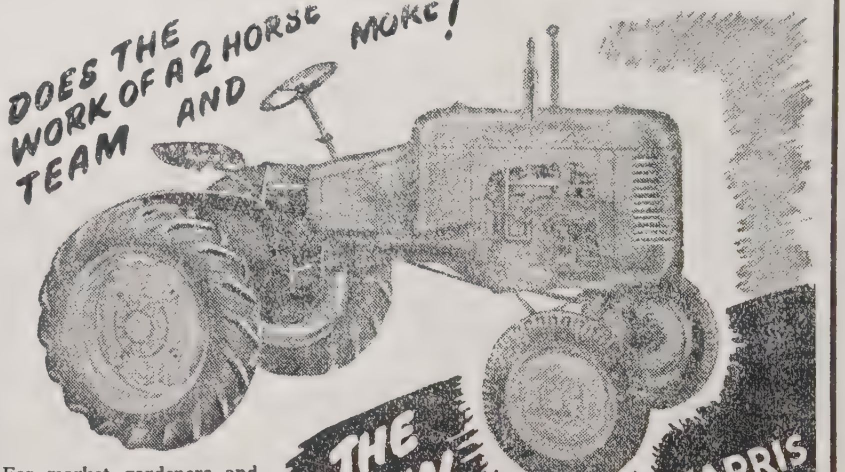
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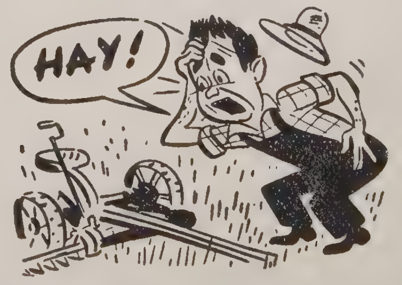

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but are neither comfortable, convenient, nor of pleasant appearance; some have been demolished, while others have been abandoned and remain as silent witnesses to a hard and unsuccessful struggle. Where farms became prosperous the owners acquired new homes for their families and the old buildings were used as the farm workers' cottages; but whether much or little improvement has been done to the original buildings, the great majority still being occupied were substandard at first and have remained sub-standard.

Good House on Each Farm

The present ex-servicemen's settlement scheme includes the provision of living accommodation, and the aim has been to have a good house suitable for a country family on each farm. On some of the blocks of land acquired under the scheme there were already homesteads and other farm cottages. Some of the older houses which were in poor repair and the reconditioning of which would have been unsatisfactory or uneconomic were judged unfit for the new settlers; this type of house was pulled down and the materials salvaged and used for sheds and other farm buildings.

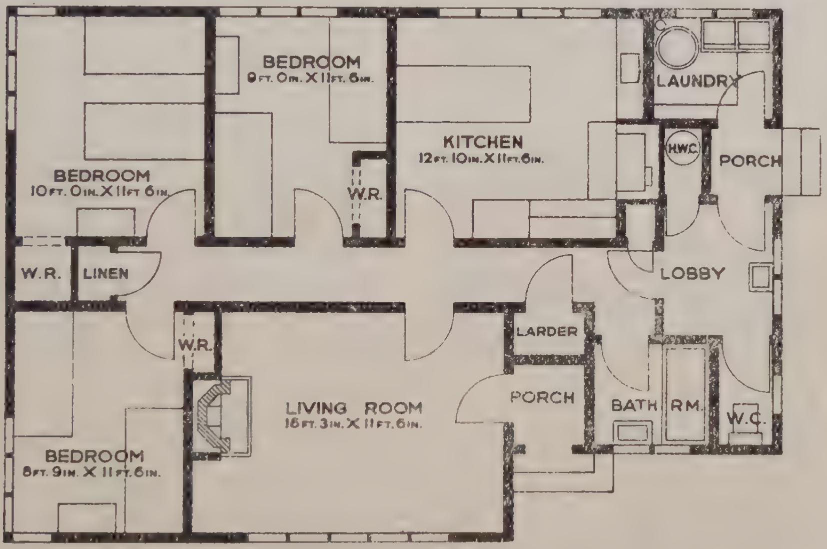
Others of these older houses were in much better condition and by repair, alterations, and additions were brought to a reasonable standard of comfort. For instance in the Te Kuiti Land Development's area repairs—most frequently to the foundations—major alterations, and redecorating of interiors and exteriors were done to 38 such houses, none of which was over 30 years old.

Features of New Houses

For the majority of the farms new houses have had to be built, and they are of a noticeably-high standard of comfort and convenience. They compare favourably with those of urban State housing schemes and have some extra features which meet the special needs of country living. There are, of course, points which could be improved on, but the plans have had to conform to present restrictions. The aim of the architects has been to give the maximum of convenience within the set limits of floor space, cost, and availability of building supplies, while also giving some variety of design.

The greater proportion of the houses have three bedrooms, living room, kitchen, bathroom, and laundry under one roof. All have an adequate water supply and on dairy farms especially, where there is an abundant permanent supply, indoor sanitation is provided, usually located near the back door. Most of the houses have a roomy back lobby in which there is an extra hand-basin and space for hanging coats. Often these lobbies have been finished with cream-painted walls, but for practical reasons they would have been much better if stained and oiled wooden linings had been used. Opinions of the womenfolk on these lobbies are divided; some think they are a good feature, while others say they would rather have had a bigger laundry containing the washbasin, hooks for coats, and racks for boots. They dislike the continual clutter and mess at the house entrance when it is used as a wash-up and changing place.

TYPICAL HOUSE FOR SETTLEMENT OF EX-SERVICEMEN



One of the plans used by the Housing Construction Department for resettling ex-servicemen. It is a compact three-bedroom house, including all modern conveniences and designed to provide adequate accommodation for a family. The back entrance has a lobby with a washbasin, storage space, and doors leading to the w.c., laundry, and the passage, which gives access to all the other rooms of the house. The kitchen is equipped with a fuel range (or in reticulated areas an electric stove if desired), built-in dresser, and large ventilated safe, and has space for a meal table, so that the living room need not be used for meals. The living room opens on to the front porch, but the doors are arranged so that there should be no direct draught. All the bedrooms have built-in wardrobes and can accommodate two single beds. Windows are placed so that all rooms of the house will receive sunshine. If necessary, it would be possible to extend the passage and build additional bedrooms, although the kitchen and living space would not be sufficient for a much larger family.

Wherever power is accessible electric stoves and water heaters have been installed and there is a power point in all rooms. In areas which are not yet reticulated the houses are to be wired for power during building to save time and expense later; in the meantime fuel ranges finished in coloured enamel with oven-door thermometers and hot-water systems are provided. Some settlers on blocks where electricity may not be available for about 5 years have put in private electric plants to serve both shed and home.

The kitchens in the new farm houses are frequently finished in cream or pastel paint, which gives a light and airy appearance in strong contrast to the gloomy walls of the kitchens built a decade ago. Many of the sink benches are of terazzo in mottled green or fawn shades and save the time and energy often expended in scrubbing a hardwood bench. The walls of some of the larger kitchens are panelled in wood with light-toned wallpaper above, an arrangement which is attractive and practical and gives a warm, homely air to a kitchen which is much used as a living room. A walk-in larder with shallow shelves round three sides is a feature in many of the houses which meets with great favour with the housewives. A working kitchenette opening off the larger living room-kitchen, seen in some of the King Country houses, is also much liked. Here preparation and clearing up after meals are expedited considerably, as everything needed is within easy reach of sink and workbench. The excellent arrangement of shelves, cupboards, bins, and safe is shown in the diagram on the next page.

Bathrooms are generally small but adequate, and have set-in baths, hand-basins, and a cupboard for shaving gear and other toiletries. Baths have often been the fixture which delayed the completion of the builder's job and an experiment is being made with terrazzo baths manufactured in Te Kuiti. If these trial baths prove satisfactory, more of them will be ordered if those of the orthodox porcelain type are still scarce.

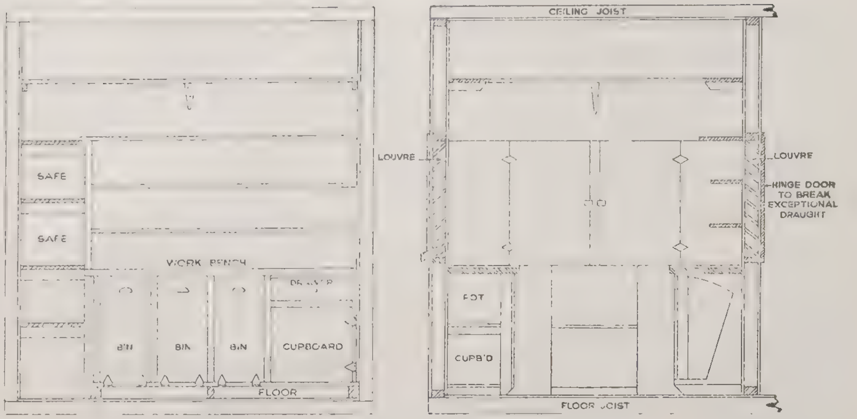
The space under the tank-stand serves a two-fold purpose: The enclosure makes a useful storage room for the lawnmower and other garden implements, wood, coal, potatoes, fowl food, and other bulky goods, while the solid wall of the stand and the house wall enclose a sheltered angle in which the baby may sleep in his pram and small children may play in safety under a watchful eye from the kitchen window.

Paths and small areas at the house entrances have been paved with concrete, and fences for the house enclosure were usually erected before the settlers arrived.

In districts where shelter trees or hedges are a necessity a fairly-large piece of ground has been enclosed to allow sufficient room for the planting of fruit trees also.

Several storage fixtures have been built in, thus effecting a saving of floor space and also of expenditure on furniture. Each bedroom has a wardrobe with shelf, rod, and hooks, though often the door has been omitted to conserve timber. A curtain hung across the opening will keep most of the dust out and a door can be fitted later when supplies are more plentiful. Linen cupboards, frequently located in the passage, are roomy and conveniently shelved. Dressers with crockery cupboards and drawers for cutlery and table linen are a useful and attractive fixture in many of the kitchen-living rooms. The Canadian type of safe with through draft from floor to ceiling has been widely adopted. They are cool and efficient, but where bins have been constructed in the lower part the arrangement is not entirely satisfactory. Flour and sugar are commodities which need to be stored in a dry place, but during a spell of wet weather the bins are damp and the sugar soon becomes moist and flour grows mouldy. Additional cupboards in some of the houses include broom cupboards, shallow recesses in the entrance hall for coats and hats, and cupboards above the door level for luggage and extra bedding.

Window area is generous in the houses, and though much of the glass is fixed, making window cleaning difficult, plenty of sunlight and fresh air is admitted. Few of the houses have either a veranda or a sunporch; possibly the omission was inevitable because of the shortage of timber, or perhaps a verandaless house is considered more up-to-date. Farm houses seem to need a veranda or porch, and many of the settlers have already planned to add something of the kind at the first opportunity.



Standard pantry fittings in some of the ex-servicemen's houses.

Joy in Own Homes

The wives of the settlers already in occupation are very satisfied with the new houses; in fact it is unusual to hear any major criticism. Generally the points raised are personal preferences, perhaps for a larger kitchen, a veranda, a more roomy detached laundry, and so on. Often the housewife frankly admits that the house far exceeds her expectations and is the most comfortable she has lived in.

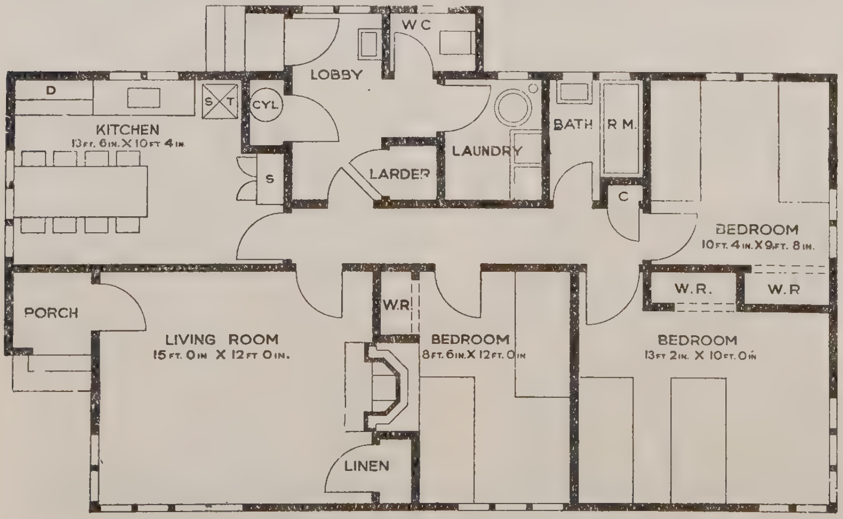
Numbers of the younger married couples have been living with relatives before settling on their farms, and their joy in having their own home is very apparent. Perhaps as time goes on they will decide that one or another existing arrangement does not suit them so well after all, but by that time they will probably be able to make alterations.

No doubt the ideal farm home has yet to be built, but the new houses on the ex-servicemen's settlement schemes are comfortable, convenient, and adapted to country living requirements.

SUMMARY OF LAND SETTLEMENT

The work of the Land Development Branch is thus seen to be of two main kinds—first, the conversion of virgin scrubland into farm land, and secondly, the reclamation of deteriorated or backward farmland. The latter, in view of the enormous question of the hill country, is perhaps the more important, but the former is at present the more interesting. At least half-a-million acres of ploughable scrubland in the Auckland and North Auckland Land Districts can be turned into ordinary, all-grass, family farms. After that the spread of intensive farming in New Zealand will depend on such semi-public activities as irrigation. The older method of providing more family farms by subdividing the larger properties cannot be carried much further on easy country without its entailing a general reduction in the standard of living.

The Lands Department is convinced that breaking in scrubland is not a job for pioneers, for whom the loss of money and the waste of energy are very real. When the State does it any loss is not real; it appears as book debits for a few years, but is eventually recovered many times over. The rate at which the work will go on depends partly on the level of employment in the country; under a full-employment policy it offers very respectable scope for men who are forced to change their employment.



Ground plan of another type of house.

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AUTUMN - SAVED PASTURE ON THE DAIRY FARM

By F. T. LEES,
Department of Agriculture Animal Research Station, Ruakura.

WHILE a host of factors, broadly summed up in the terms breeding, feeding, and management, contribute to high-production dairy farming, and while high individual productions are the result of a nice balance of all such factors, it is possible to spotlight the more important practices involved. Such spotlighting is of great importance in times like the present when the maximum output of milk and butterfat is so urgently needed. To contribute toward an immediate, as opposed to a long-term, increase in output, focus must be on methods capable not merely of immediate application but of immediate results. From this point of view feeding methods offer the most profitable line of attack. The quality of cattle can be improved, but only slowly and after years of planned effort. Management practices of all kinds need attention, but farmers generally are hard to convince and slower to change from long-established routines. There is no doubt, however, that by better feeding of existing cattle a considerable lift in production could be achieved.

THIS article spotlights one particular aspect of feeding which has proved its value on dairy farms during the past few years—the practice of using "autumn-saved pastures," which appears well worth while but so far has not found its way into general use. Critical examination of this method of feed provision was first made at the Massey Agricultural College, where Professor Riddet has successfully developed the practice during the last 10 years. One of the first and one of the few farmers to apply the method is Mr. W. S. Long, of Levin. At the Ruakura Animal Research Station also considerable attention has been devoted to the technique for some years, and so satisfactory have the results been that the use of autumn-saved pasture is now a standard practice at all dairies on the station, where good feeding and high production are the aim.

At the present state of knowledge it is impossible to define just what constitutes good feeding of a dairy cow or herd on grassland. Many problems in this connection are still under study and many more await planned experimental attack before any definite answer can be given. From the viewpoint of maximum production per cow, however, few will disagree with the view that the problem of good feeding under New Zealand grassland dairying conditions is largely a matter of ironing out the very **uneven supply** of feed from pasture in order to supply the very much more **even feed requirements** of the dairy cow. Many well-established practices of tried and proven worth are concerned here—high-quality and high-producing pastures, topdressing, close subdivision to permit controlled grazing, maximum conservation of hay and silage from flush periods for use during periods of feed shortage, together with a host of other general pasture management practices. To this list, with which all dairymen are familiar, should now be added the use of autumn-saved pasture.

What is Autumn-saved Pasture?

The name autumn-saved pasture is practically self-explanatory. It consists of feed grown during the normal autumn flush period which is held in cold storage in the field during winter for use in the late winter-early spring period. Under conditions of seasonal dairying in the Dominion cows produce higher yields when brought to profit a month to 6 weeks before grass growth recommences vigorously after the winter dormant period. During this 6 weeks the feed available from normal pasture growth is inadequate to support maximum yields of milk. Special provision has to be made to meet this deficiency between feed available and feed required. Good-quality hay will help to bridge the gap, but hay fed alone is not a milk-producing diet and fails to solve the problem. Silage will give more satisfactory results, but neither is as efficient as adequate grass. Autumn saving is one practical method of providing this grass. A specially-selected area is closed to stock during part of the autumn growing period and held ungrazed until required by the newly-calved cows in the following late winter-early spring. It is not a substitute for hay and silage, but provides a most valuable milk-producing supplement to these normal fodders at this time. Well saved, from good-quality pasture, and used when about 9in. high, the material has been shown by Ruakura experiments to have a digestibility and nutritive value little inferior to that of good-quality pasture produced during the main growing season. Measurements of the yield of fodder available from 9in. autumn-saved pasture have averaged about 1500 to 2000lb. of dry matter per acre—about a fifth of the total annual yield from an acre of good dairy pasture. In other words it is a practice which enables the farmer to hold for use during a critical period approximately a fifth of the total amount of fodder grown from the area concerned in a complete year. Moreover, the material can be of high milk-producing quality.

Shutting Up

The production of autumn-saved pasture must be planned before the commencement of the autumn flush period, when an early topdressing of the area to be saved is most desirable to ensure maximum and long-continued growth. It is also important to make certain that the area is evenly grazed, clean of any tendency toward clumpiness, and chain-harrowed to spread droppings before it is shut up. A well-sheltered field that is also well drained is of great assistance not only in growing the feed needed, but also in using it efficiently in the wet, cold weather usually typical of the feeding-off period.

Time of closing will vary with district, season, condition of the pasture, and time of use. The decision about time of closing requires sound judgment on the part of the farmer if best results are to be obtained. The aim should be to have available when required an even, leafy sward of grass 9in. high. Material longer and more mature than this declines rapidly in digestibility and milk-producing qualities, and in addition tends to damage the sward. Excessive growth tends to encourage rot at ground level, discourage clover growth, and encourage fog, cocksfoot, and prairie grass. For this reason the better pastures should be selected and the aim must be to take advantage of the late, rather than the early, period of the autumn flush, so that growth is not too far advanced when the dormant period begins. It should be borne in mind that this type of pasture produces a greater bulk of fodder than a similar area that is grazed during the same period, due partly to the protection afforded by the longer material. Provided grazing off is not too close and pugging does not occur, the recovery of such areas after grazing in the early spring is also more rapid than that of fields close grazed during the winter period. A quick removal of the stored material is therefore advantageous to a quick recovery in the spring.

Of considerable importance to the system is the area to be closed and saved in this way. After much experience of the system officers of the Ruakura dairies close approximately one-fifth of the grazing area. In a normal season this can be relied upon to produce at least 1500 to 2000lb. of dry matter per acre when ready for use. This quantity will provide 3 to 4 cows per acre with a ration of 50 to 60lb. of green feed per day for 6 weeks—about half their total requirement.

Method of Use

The whole key to the successful use of autumn-saved pasture lies in the method of utilisation. The principle must be one of rationing on a break-grazing basis, and here the use of the electric fence is most essential. A field of autumn-saved pasture should be regarded as a storehouse of valuable milk-producing food, every blade of which should be eaten by the milking cows. To turn the herd into such a field is to waste a large proportion of it. Complete utilisation and wise utilisation, giving maximum spread and maximum benefit, can come only by cutting off a narrow break with an electric fence each day. The size of the break is adjusted to give a reasonable feed of grass in an hour's grazing immediately after the morning milking. The stock may then be moved to receive their hay and silage ration, or this material may be fed out on the already-grazed autumn pasture areas. Either type of management results in no spoiling of fodder, reduces frost damage to a minimum, and gives complete utilisation. Feeding back of hay and silage over the already-grazed areas has the advantage of keeping stock off the remainder of the farm, growth on which will come away more rapidly than if it is continuously close grazed. It will also result in heavy manuring of the autumn-saved area, which will be reflected in subsequent good recovery. On the other hand, grazing back tends to pug the area more and will retard recovery of growth. The decision here must rest upon various management problems associated with the farm as a whole. Both methods are commonly practised at Ruakura as circumstances dictate.

The advantages of this type of feed will be obvious. The early spring period is one of the most critical for the milking herd. Production can be quickly pushed to and maintained at a high level; the swing into a full-grass ration is achieved more smoothly; the remainder of the farm attains dairy feed condition more quickly and the difficulties commonly associated with rapidly-growing, very short pasture are avoided; the cows are not subject to a period of semi-starvation at a critical stage; their body weights are more readily maintained and subsequent ability to stand a period of feed shortage improved; while, overall, a definite increase in production results. Two hours' grazing per day provides approximately 50lb. of green feed per cow. This, along with a normal supplement of 30 to 40lb. of silage per day and free access to hay, will satisfy the requirements of most cows.

Disadvantages

The technique is not without its disadvantages and risks. A certain amount of labour is associated with the use of the electric fence and its daily shift to give break grazing. This is not excessive, however, and, in the opinion of most who have tried it, is compensated for by the reduced amount of feeding out necessary. Ten minutes per day is the time required to shift the fence at Ruakura. The method, unless wisely managed, is capable of having harmful effects upon pasture composition and condition. Clovers can be reduced unduly if it is practised each year on the same area; Yorkshire fog tends to increase in pastures carrying this grass; ryegrass is also reduced in favour of cocksfoot and the broader-leafed grasses. Rotation of autumn-saved areas around the farm will minimise all of these difficulties, while care to avoid too long a storage period at too advanced a stage of growth will also reduce trouble. These effects can be capitalised in high clover, bloat-risky pastures where the reduction in clover and provision of more mature feed over the danger period is of considerable value.

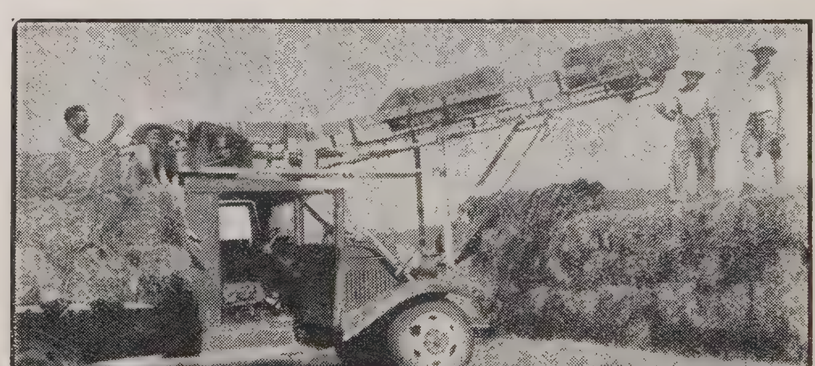
Summing up the position, it is the conviction at Ruakura that the adoption of the practice of using autumn-saved pasture as a means of providing milk-producing food to the herd in the late winter-early spring is capable of very great and very profitable extension among grassland farmers. Such development would result in increased production from dairy farms at no added cost, and is well worth a trial by any farmer seeking to improve his efficiency.

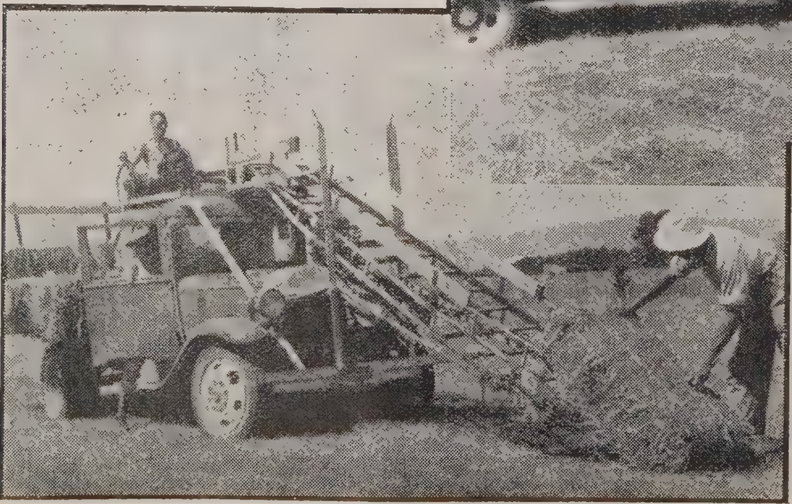
* * *

Elevator Attachment for use with Pick-up Baler

THE advent of the pick-up hay baler has lessened the amount of labour at harvesting considerably, but the bales of hay still have to be retrieved from the paddock. To assist in this a farmer in the Matamata district has built an attachment to his truck consisting of a movable elevator driven by a small petrol engine mounted on the cab.

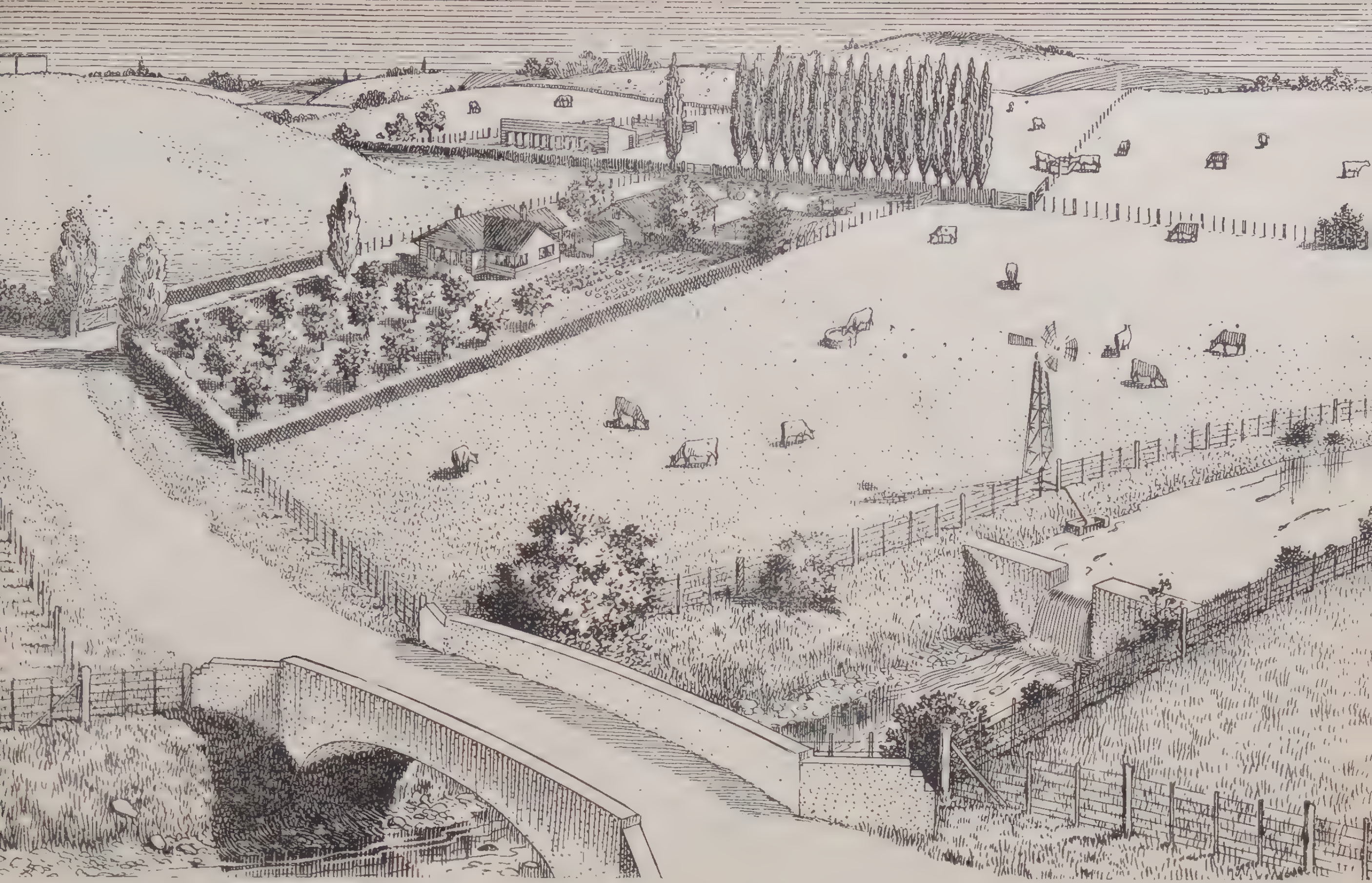
The truck follows the pick-up baler, but is preceded by a man who raises one end of the prostrate bale and allows it to fall on to the elevator, where it proceeds to another man on the truck and is stacked.





When fully loaded the truck is driven to the stack site, the elevator is raised, the gear of the engine reversed, and the bales are conveyed from the lorry to the stack. During this operation the driver of the lorry and the man who preceded it in the field are employed in building the stack. Practically no lifting of the bales by hand is necessary, only the last few on the truck having to be lifted to the height of the cab.

—G. A. BLAKE,
Instructor in Agriculture, Department of Agriculture, Matamata.



ESTABLISHING A FARM WATER SUPPLY SYSTEM

IN the first section of this article which was published in last month's "Journal," H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, discussed the selection of a source of water supply, different water supply systems, pressure, storage, and volume, and equipment used in water supply systems. This concluding section deals chiefly with the position of fittings, auxiliary equipment, the installation of a water supply system, and purification of water.

IN planning the layout of a piped water supply the arrangement of equipment available on the market has to be considered and two principles must be observed: Utility and economy. Utility means a handy, trouble-free system that gives water in the quantity and at the points required year by year with no more attention than routine maintenance. Economy means a system installed at a minimum expense without sacrificing utility and one that will operate for a reasonable period without the recurrence of capital expenditure for replacement parts. The correct choice and positioning of piping and fittings, the correct choice and siting of pumps and reservoirs, and the correct choice of power will give both utility and economy.

Attention should be given to the following points in deciding the physical layout of the system:—

1. The positioning of gravity storage in relation to the points of outlet should be arranged to give minimum length of pipe runs.

2. The positioning of a pump in relation to gravity storage should be arranged to give minimum length of pipelines, both suction and discharge, and minimum length of powerline if the pump is electrically operated. A compromise may have to be made between length of pipe and length of powerline, with concession in length to whichever is the less expensive to construct.

3. The positioning of a pump in relation to a stream should be such that minimum interference is caused by flooding, silting, or debris. Pump suction facilities should be arranged to avoid interference from these sources.

4. Taps or outlet valves of the correct size to suit pressure and required volume should be placed in the most convenient positions.

5. The capacity of service mains supplying points of outlet should be capable of providing for any future loading as well as for immediate needs. Plugged T pieces should be provided on service mains where it is considered future connections may be required.

6. Sufficient control valves should be provided to enable sections of the system to be isolated for maintenance without interruption to the whole system; for example, where a ball-cock is installed a control valve should be provided.

7. Master valves should be provided at storage outlets to enable the complete system to be isolated.

8. Where pumping to a high head or to the bottom of a reservoir a check valve should be installed between a stop valve and the pump to enable the pump to be opened up without loss of water in the delivery pipe. The provision of a stop valve is a precaution in case the check valve is damaged. Check valves should be used in all cases where uni-directional flow is desirable.

9. High points in pipelines where air can be trapped should be avoided, and if this is not possible, air valves must be provided; otherwise air locks will occur.

Methods of Economy

To economise in the use of pipe, branches from the service main to the taps or points of outlet should be as short and as direct as possible. Several outlet points may be supplied by one pipe connected to the service main, provided its size is proportioned to the volume required for the number of points likely to be in use at any one time.

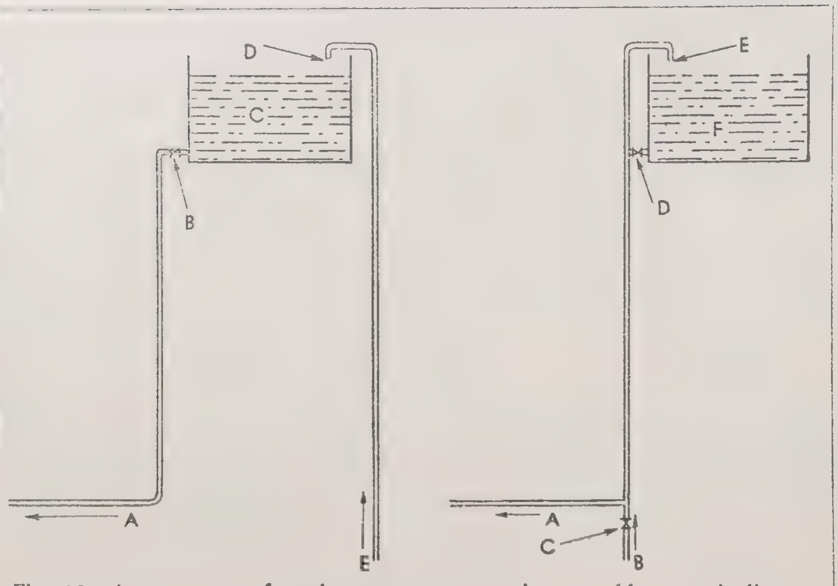


Fig. 18—Arrangement of equipment at a reservoir to enable one pipeline to carry the intake from the pump and the outlet flow to the service main. Left: Normal system with two parallel mains. A—Service main. B—Stop valve. C—Reservoir. D—Open end of pump line. E—Pump line. Right: Combined mains. A—Service main. B—Pump line. C—Check valve. D—Stop valve. E—Open end of pipeline. F—Reservoir.

A saving in piping can be made where a pump line runs parallel to a service main from the reservoir. Fig. 18 shows how one pipeline may be arranged at the reservoir to carry the intake from the pump and the outlet flow to the service main. If the pump main and service main differ in size, the larger must be used from the junction of the two to the storage reservoir.

Auxiliary Equipment

Tanks, dams, filters, stock-watering troughs, and water softeners form part of water supply schemes and can be considered as auxiliary to the main scheme of supply, storage, and distribution.

Tanks

Tanks may be built of a variety of materials, constructed to any suitable shape, and mounted either above or below ground to suit the layout of the water supply system.

Steel tanks: Most dwellings in which a rain-water supply is obtainable by roof catchment are provided with galvanised, sheet-steel tanks, the most common being the square 400-gallon and the round, corrugated 500-gallon tanks. The tank is always mounted above ground level, usually low enough to enable collection of roof water and high enough to provide some gravity fall to the taps.

These tanks should never be installed singly, except where the loss of water from the tank would not matter. It is better to provide two smaller tanks with an isolating valve between them than one large one. This enables one tank to be emptied ahead of the other and permits the periodical cleaning out of both tanks. Down-pipes, covers, and vents should be arranged and protected with wire gauze so that vermin or debris cannot gain entry. Down-pipes can be carried into a funnel with sufficient screen area to allow the maximum volume of water to pass.

Dwellings near the sea that depend on roof water should have detachable down-pipes to the tanks. During fine weather the pipes are removed from the tanks, and after rain has washed the roof for 15 minutes the pipes can be replaced and the water collected. This precaution is necessary where such water is used for engine-cooling, as spray-laden winds off the sea cause a deposit of chlorides on the roof, which is carried into the tank by rain and can cause rapid corrosion of engine-cooling water jackets.

Cast-iron, segmental tanks: These tanks have the bottom and sides built up of cast-iron segments and are made either square or round. Such tanks are built for bigger capacities and are usually mounted on a steel structure at an elevation sufficient to provide gravity head.

Wooden tanks are made for fairly-large capacities and are usually built from wooden slats bound with steel bands in the same way as a barrel. Tanks of this type are used at railway watering places.

Pre-cast or spun-concrete tanks: Reinforced pre-cast or spun-concrete tanks can be obtained in a range of capacities up to about 1000 gallons and are suitable for placing either above or below ground. They are watertight, and if properly installed, present no maintenance problems.

Reinforced concrete tanks can be constructed to any shape and capacity for placing either above or below ground. They should be bulit by an expert, because if the shape of the tank is not properly designed and the size and positioning of the reinforcing steel are incorrect, the tank will not be successful.

Underground or partially-underground concrete tanks are ideal for storage of rain-water in districts subject to long dry summers; if enough storage is available, winter rainfall in New Zealand is usually sufficient to provide water for a year-round supply. The method is to retain one or two 400-gallon tanks to provide a gravity head to the pipe system and run an overflow from these to underground storage. These tanks would always be full during the winter, and any surplus would overflow and be stored in the concrete tanks for use in summer. During summer, when rainfall is limited, water is pumped from the concrete tanks back to the gravity tanks as required.

A sectional view of a semi-underground, round, concrete tank is shown in Fig. 19. This type of tank is normally provided with a timber roof covered with tarred roofing material and supported on a central column. An underground, rectangular tank is built in the same way as a round tank and may be made with either a pre-cast slab top or integral reinforced top.

Dams

Dams are the retainers of reservoirs formed in creek-beds or river-beds, and may be required to provide feed and storage for a natural gravity system or to feed a drive pipe for a hydraulic ram. In either case the provision of a dam in a permanent water supply should not be contemplated without due consideration to its location, freedom from fouling, and protection from stock. If the water

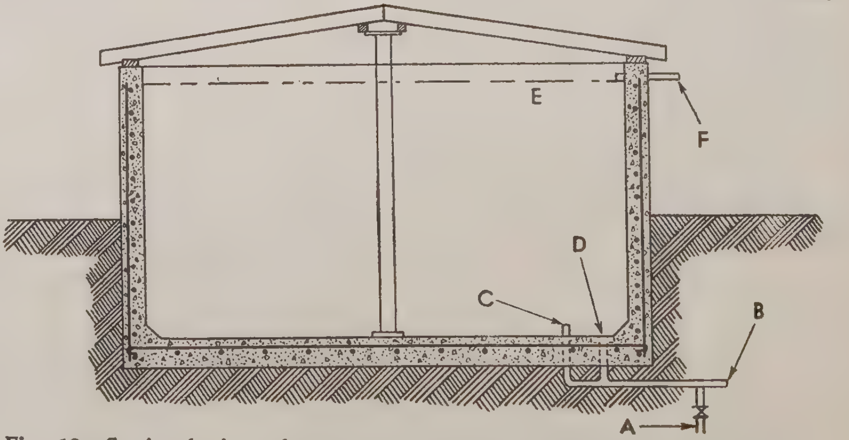


Fig. 19—Sectional view of a round, reinforced-concrete tank. A—Delivery. B—Plugged drain. C—Outlet. D—Plug. E—Water level. F—Overflow.

supply is to be drawn from a stream that must be dammed to provide storage, the volume of flow should in all cases be greater than the draw-off, so that the dam will act more as a weir and the water in the reservoir behind it will be constantly changing, the excess flowing over the dam.

Dams should be sited on streams above the point where stock have access to the stream and fenced off. If the dam is not surrounded by bush, trees should be planted round it to keep the water cool. Stock can be provided with a drinking place below the dam.

As a foul dam can afford a likely source of stock infection by Internal parasites, it should receive chemical treatment when necessary to clear it of sediment, organic matter, and algous growth. Expert advice should be obtained when this treatment has to be given.

Log dam: Fig. 20 shows the construction of a log dam, which is formed by placing beech or other suitable logs horizontally across the stream. A trench about 3ft. long is cut into each bank down to the level of the centre of the streambed and the logs are dropped into it. Short, vertical, pointed poles or logs are driven down at each side of the stream to protect the banks and lessen the risk of their being scoured away in a flood. It is advisable to put in the side poles first, a gap of sufficient width being left for the horizontal timbers to be inserted afterward.

The site chosen for the dam should be one where the banks are free from boulders or tree roots and where the bed at the base of the dam can be cleared of as much loose material as possible. If possible, it is advisable to get the bottom horizontal timber well below the natural bed of the stream. When all the timbers are in place they should be thoroughly backed with stiff clay puddle, which should be well rammed down behind the horizontal timbers and the side piles. The side piles should be high enough to reach a few inches above the top of the banks.

The feed pipe from the dam is fixed with its top 12 to 15in. below the overflow level and its mouth should be protected with a rose or strainer of suitable dimensions.

The same type of dam can be built with old, creosoted railway sleepers instead of logs. Standard sleepers may be used for the side piling, and if longer ones are needed for the horizontal timbers, "crossing sleepers" can be used.

Bag dam: Fig. 21 shows the military method of building a dam by the use of bags of dry-cement concrete dropped into the stream one over the other till the water is raised to the required level. This is the simplest method of building a substantial and permanent dam.

The streambed and side banks should first be cleaned and all loose boulders or roots taken out. The concrete should be in the approximate proportions of 1 part of cement: 2 of sand: 3 of gravel (5 : 1 mix by volume). The bags used should be only about two-thirds filled so that they will "bed" well one on the other to form a compact mass when set. The concrete must be thoroughly mixed (dry) before being put into the

TYPES OF DAMS

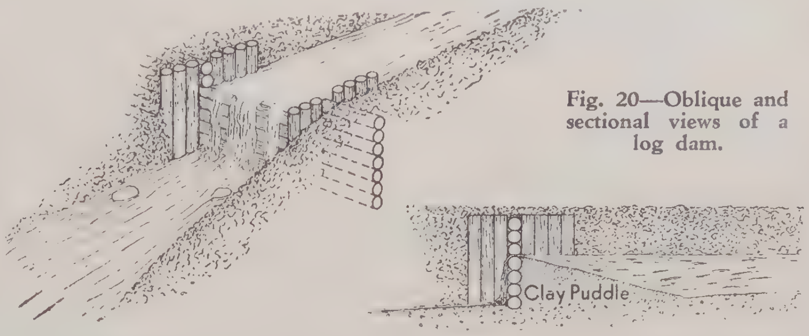


Fig. 20—Oblique and sectional views of a log dam.

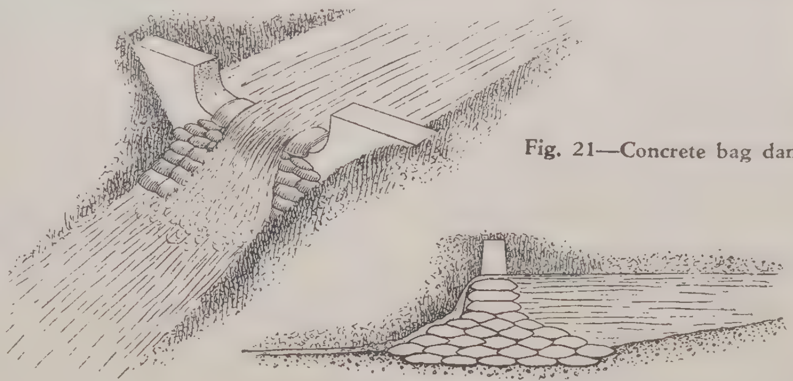


Fig. 21—Concrete bag dam.

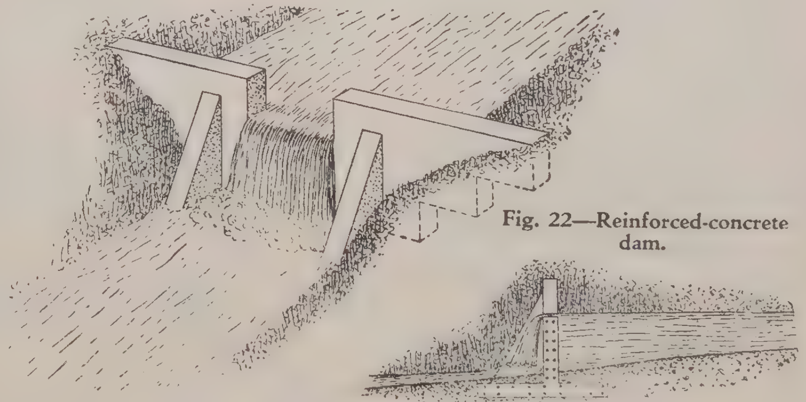


Fig. 22—Reinforced-concrete dam.

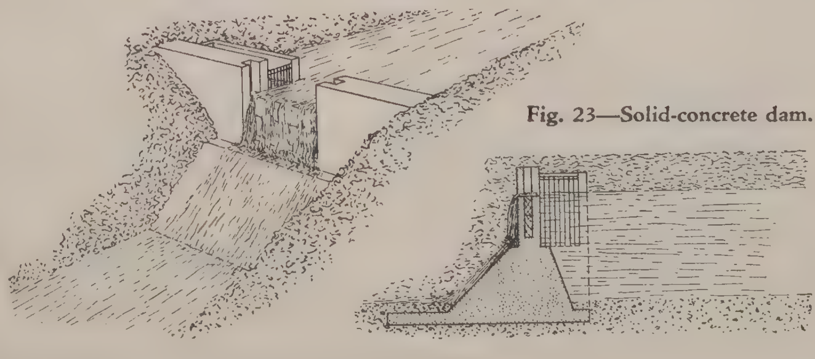
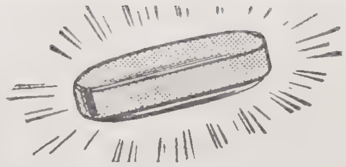


Fig. 23—Solid-concrete dam.



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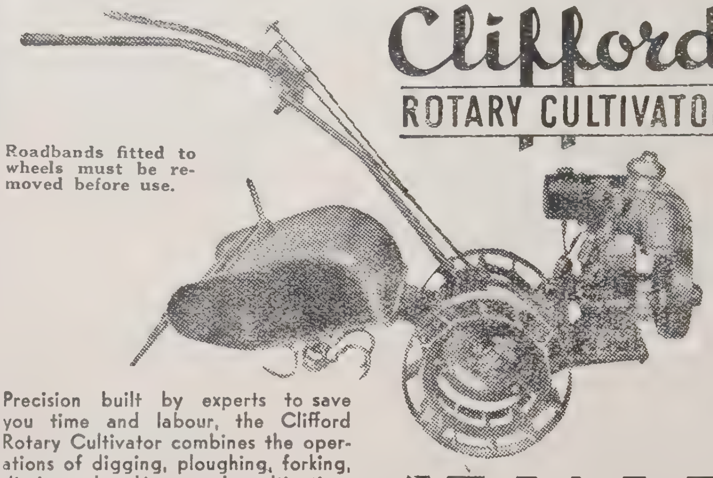

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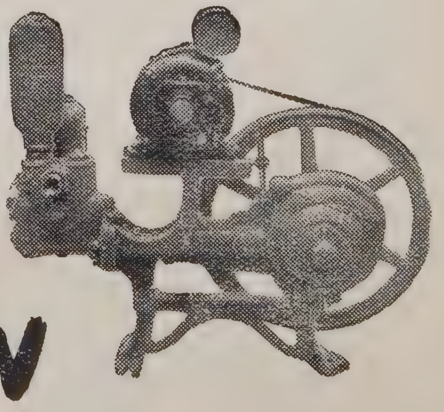

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bags, which are gently dropped into the water in rows, as shown in the diagram. The portion of the dam above water level may be built of concrete in the ordinary way, and the draw-off pipe should be inserted at the proper level.

Reinforced-concrete dam: A dam built of concrete reinforced with steel rods or bars is shown in Fig. 22. By the use of reinforcing that is correctly sized and properly spaced the concrete walls and buttresses may be of comparatively-narrow dimensions, walls of 9in. thickness being sufficient for a fairly-large dam. To be effective reinforcing of concrete must be designed and not done haphazardly; reinforcing with scrap iron and old bedsteads is worse than useless.

Solid-concrete dam: Fig. 23 shows a solid-concrete dam with the jambs of the crest grooved. By the use of planks in the grooves the level of the water can be regulated to some extent according to the volume of water flowing. The supply pipe is laid from a small intake well with an iron grating on one side of the dam.

Filters

Where tank storage for a piped water system is liable to become contaminated with foreign material it is advisable to install a filter between the supply and the storage tank. Several types of pressure filters with a wide range of capacities are manufactured and can be installed on the supply line if the supply has a gravity head. They should preferably be installed in pairs and each fitted with isolating valves to allow one to be cleaned while the other is in use.

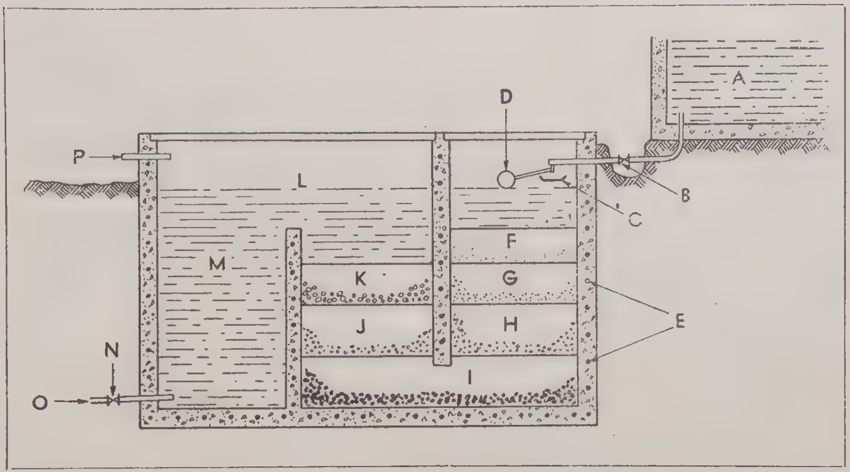

Fig. 25—Sectional view of a cascade filter. A—Supply tank. B—Stop valve. C—Baffle. D—Ball-cock. E—Reinforcing rods. F—Fine sand. G—Coarse sand. H—Gravel. I—Dust-free coke or charcoal. J—Gravel. K—Pebbles. L—Water level. M—Storage. N—Stop valve. O—Outlet. P—Overflow.

The filtering medium of pressure filters may be processed chalk or charcoal, and sometimes sandstone is used. The chalk or charcoal may be arranged either as a candle or plate and the sandstone as a dome, and to facilitate cleaning, the outside of each type is exposed to the polluted water. These three types of pressure filters are shown in Fig. 24.

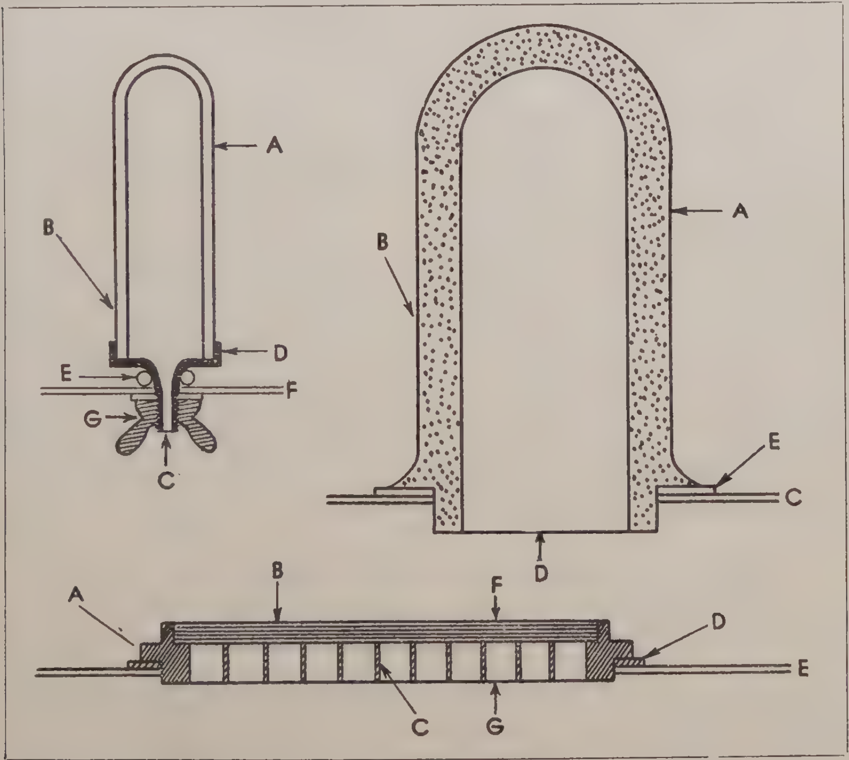

Fig. 24—Three types of pressure filters. Upper left: Processed chalk or charcoal filter candle. A—Chalk candle. B—Pressure side. C—Discharge side. D—Metal base. E—Rubber ring. F—Dividing plate. G—Wing nut. Upper right: Sandstone filter dome. A—Sandstone dome. B—Pressure side. C—Division plate. D—Discharge side. E—Rubber ring. Lower: Processed chalk or charcoal filter plate. A—Metal frame. B—Processed chalk or charcoal. C—Square-holed grid. D—Rubber ring. E—Division plate of filter. F—Pressure side of plate. G—Discharge side of plate.

A simple type of filter adaptable to ball-cock control is the cascade filter, shown in Fig. 25. This is a gravel-bed type of filter built in reinforced concrete and it can be proportioned to suit the location and the requirements of the water supply. Pumice can be used for the bottom filter bed in place of coke or charcoal.

It should be remembered that filters are not purifiers and will not separate dissolved mineral or chemical salts or all bacteria from the water, but only solid or vegetable matter held in suspension.

Water Softeners

In most locations where the natural supply is hard the water is used for stock and a rain-water supply is arranged for the dwelling. This arrangement has drawbacks, as sufficient rain-water storage is seldom provided to meet peak requirements and the dwelling is without water in a dry summer unless a by-pass from the stock water supply has been provided. Immediately hard water is admitted to the domestic system the advantages of having an independent soft-water supply are lost. The provision of a water softener between the hard supply and domestic demand can eliminate this disadvantage and probably make the stock water supply permanently available for domestic use, allowing the rain-water supply to be dispensed with, though some rain-water storage should be retained as an emergency.

To get an exact measure of the hardness of water a rather elaborate method is necessary. However, a fairly-accurate measure can be made by the so-called "soap test," which is carried out as follows: Put 22 c.c. of the water to be tested in a small, clean, glass bottle of a capacity of about 80 c.c. or 3 fl. oz. Add "standard soap solution" to the water one drop at a time, shaking the bottle vigorously after each drop. The number of drops that must be added to produce a substantial lather on the water after shaking is the approximate hardness, expressed in number of grains. Thus, if it requires 8 drops of soap solution to form a lather, the water tested has about 8 grains of hardness. Best results are obtained in this test if the soap solution is added with a dropper.

Though standard soap solution may not be obtainable from chemist shops, it is available from wholesale drug merchants.

Hardness of water is usually expressed in parts per million, and as 17.1 parts per million are equal to one grain of hardness, water having 8 grains of hardness would have 8 x 17.1, or 136.8 parts, of lime or gypsum to each million parts of water.

The commercial water softeners available for removing hardness consist of a tank of chemicals or minerals (zeolite) through which the water flows on its way to the domestic supply. The chemicals or minerals reduce the calcium content of the water, but as they eventually lose their potency, they require to be revived by washing with a brine solution. Most commercial water softeners are provided with equipment to enable this reviving to be done quickly and easily by using common rock or block salt.

If the water contains a considerable quantity of iron, it should pass through an iron filter before the softener, as the iron may accumulate in the softener and destroy its effectiveness. Furthermore, the removal of the iron from the water will make the water clearer and will reduce the staining of plumbing fixtures and clothing washed in the water.

Facilities for Using Water

As water is required on farms for domestic use, washing and sterilising in the milking shed, watering stock in paddocks, cultivation of crops in the garden and orchard, and for fire-fighting and general purposes around the homestead, different facilities are necessary for convenience of applying water to its various uses.

Domestic Use

The domestic uses of water are for the washing of dishes and clothes, for personal washing (and if drainage is fitted, toilet purposes), and for drinking and cooking. To provide for these purposes bathrooms, kitchen sinks, and wash-houses are provided with running water, and if these units are fully convenient, both hot and cold water is available.

The placing of such units as bathroom, kitchen sink, and wash-house in a house depends on individual requirements and on the design, but both requirements and design are often decided without reference to water supply or drainage, and expense is incurred which could have been avoided if the plumbing layout had received consideration. The plan which takes into consideration the plumbing layout need not detract from requirements and can be just as pleasing as any other, yet have a plumbing system less costly to install and probably more efficient.

Points to remember in considering a plumbing system in relation to house design are: First, pipe runs, particularly for a hot-water system, should be as short as possible; and second, drains should contain as few bends as possible. These points have been observed in the English mass production of a central unit round which the house is designed. This unit can be placed at right-angles to an outside wall and contains bathroom facilities on one side and kitchen facilities on the other, with a solid-fuel fireplace for a sitting-room on the end opposite the outside wall. A hot-water cylinder heated either electrically, by gas, or from a wet-back in the solid-fuel fireplace is built into the unit. In this way internal runs of piping are reduced to a minimum and external mains for gas, water, sewerage, and electricity are brought to the one point outside the building.

All designs might not lend themselves to the adoption of a unit of this type, but whatever the design of a dwelling, the points of usage of water—bathroom, kitchen, and wash-house—should be as close together as possible and preferably on only one side of the house so that drains can be laid in a straight run. This not only reduces plumbing costs, but tends to give a more efficient hot-water system, as less pipe radiation takes place.

Before alteration or installation of a cold- or hot-water system is planned for a house an inspection should be made to see whether greater convenience can be obtained by changing the positions of such work places as the sink rather than by piping the water to the point where it was used hitherto. Running water may not save much time and labour if the working area is still inconvenient. The sink should be placed convenient to the light, be provided with ample bench space on either side, and be at correct height for the average worker. (The average height of 32in. for a sink bench is generally rather low, and 34in. may be found more convenient. A few inches more or less can mean the difference between comfort and discomfort in the routine task of washing dishes.)

If the hot-water system is heated by electricity, a range, or a chip heater, a great deal of heat will be saved if the piping is copper and well lagged. In a long hot-water run intermittently used a pipeful of hot water is left to cool by radiation every time water is drawn from the run. A short run well lagged means less heat loss. The use of copper not only minimises corrosion, but minimises heat loss, as copper is a quick conductor of heat, and if lagged, less heat is dissipated. Copper pipe is also thinner than steel, so there is less metal to absorb the heat.

If a piped water supply is to be altered or installed in a bathroom not arranged conveniently, opportunity should be taken of replanning the layout of the bathroom. A wash-basin may perhaps be moved to a position where a wall cupboard with a mirror inside the door can be provided, or if the bath is an old-fashioned type, it can be boxed in to eliminate having to clean underneath it. Thoughtful planning will soon reveal alterations that can be made to ease the routine work in the home; for example, the provision in, say, the back porch of a wash-basin fitted with hot- and cold-water supply would avoid the need for people who have been working outside to walk through the house to wash at mealtimes, thereby helping to keep both house and bathroom clean.

Milking shed

A plentiful supply of both hot water (for sterilising and utensil washing) and cold water (for floor washing and milk cooler) is required in the milking shed. Whatever form the equipment takes, the principles governing the domestic water supply also apply to the cowshed. Pipe runs should be short and drains should contain as few bends as possible. The hot-water system should be non-ferrous throughout and runs well lagged. Consideration of the plumbing system in the planning of the milking shed is more profitable than adapting the plumbing to the building.

Paddocks

A well-planned farm water supply provides stock-watering facilities in every paddock not served by a natural water supply. This means the installation of drinking-troughs controlled by ball-cocks, by which the level is kept constant after intermittent use by stock, and of a capacity sufficient to provide for prolonged use. In a stock water supply it is preferable to provide storage in a number of drinking troughs of medium size placed around the farm than to concentrate all the storage in one large supply tank. For this reason drinking troughs larger

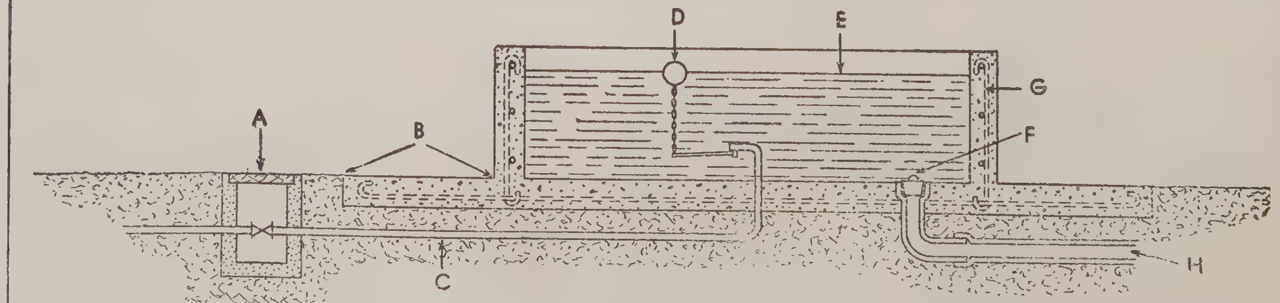

Fig. 26—Sectional view of a round or square concrete stock-watering trough. A—Stop valve chamber with lid. B—Apron. C—Supply. D—Ball-and-chain cock. E—Water level. F—Rubber-sealed and weighted plug. G—Reinforcing. H—Drain.

than those required to supply the stock economically may be an advantage.

Though the most suitable size of trough will depend on the number of stock to be watered, the trough must be large enough to allow free drinking without undue congestion. As cows are the heaviest drinkers, troughs should be of volume sufficient to allow 4 gallons per animal per paddock, but this quantity can be increased with advantage, particularly if the feed flow is small.

The shape and construction of stock-watering troughs vary considerably; wood or iron ones may be used, but the most satisfactory are made of concrete. Circular or square troughs have distinct advantages; they will cater for the needs of the greatest number of animals at any one time, and one trough can be used for two or more paddocks. If placed on the boundary between two paddocks, one half of the trough is available to each paddock; if at the corner of four paddocks, stock in each paddock can have access to a quarter of the trough.

Details of the construction of both circular and square concrete troughs are set out in Bulletin No. 184, "Concrete on the Farm," issued by the Department of Agriculture and available from any office of the Department.

Fig. 26 shows a typical section through a reinforced-concrete trough constructed with an apron to prevent the ground round the trough becoming mucky.

Garden and Orchard

Water service for the garden and orchard includes the supply of water for such items as large-scale spray irrigation for crops and pastures, which is a method of supplementary irrigation that can be used to advantage in nearly all humid areas on such crops as vegetables, small fruits, potatoes, and sugar beet and on pastures. This is made possible by the use of light-weight, quick-coupling pipes fitted with either revolving sprinklers or fixed spray nozzles.

Points round the Homestead

Though many farms have a good water supply system, the distribution round the homestead does not always receive the attention it should. There may be no outlet point near the barn or implement shed, and water for the fowl run may have to be carried some distance. Even where outlets are provided, the size of pipe used is usually too small to allow adequate flow, or the pressure may be too low to permit a hose to be used. Though outlet points round the farmyard may be kept at a minimum for the sake of economy, they should be placed to give the best service and should have ample volume and if possible pressure sufficient for a hose. Not all water services have the necessary pressure for a hose, but in the event of fire quick access to a hose, even if it is only of garden size, which can be connected to a handy tap outside the house or in the yard may be the means of averting disaster.

The question of obtaining enough pressure to operate a hose could well be considered when planning a water supply system. Any pressure above 20lb. per square inch gives a good velocity through a small hose nozzle, provided the volume is not restricted by too small a supply pipe.

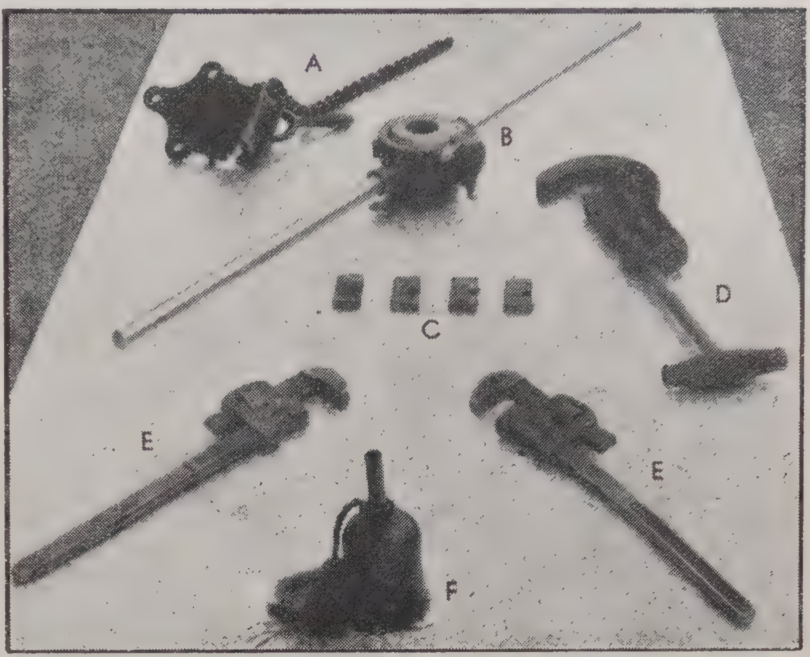

Fig. 27—Tools required for pipe laying. A—Pipe vice. B—Stocks. C—Dies. D—Pipe cutters. E—Pipe wrenches. F—Plumbers' hemp and paint.

Installing a Water Supply System

If properly planned, the installation of a good water supply system is not difficult, though certain tools are necessary. When the locations of the pump and reservoir have been decided and convenient positions for the various troughs and outlets have been fixed the lines for the pipes can be marked out as planned and the trenches prepared. A single-furrow plough is suitable for this work, the finishing being done by spade. The depth should be sufficient to protect the pipes from frost and, where the ground is likely to be cultivated, from implements. A depth of 12 to 18in. is sufficient for most purposes, though the water will be cooler in summer if the trench is deeper.

The work of laying the pipes is comparatively simple. The lengths of piping are laid alongside the trench and the screwing together can be done on battens laid across the trench. As the length of the pipeline increases the pipe can be laid along the trench, leaving, say, only the last two lengths resting on battens till more pipes have been added. Working in this way it is easier to lay the pipes, as there is plenty of room for swinging a wrench, and the male ends can be squared to the sockets to make screwing easier. Where a lead-off or branch is to be taken the pipe is cut to give the required length, threaded, and a right-angle bend or T piece fitted as required. The pipelines are run merely by screwing pipes of the lengths required together with the required fittings.

Tools

Though the range of tools required for pipe work is not great, the correct tools must be used. Fig. 27 shows some of the tools required. A hacksaw may be used instead of pipe-cutters, and pipe-joint compound instead of red-lead paint. The sizes of pipe wrenches, pipe vice, and dies must be suitable to the pipe sizes being handled. For example, a 24in. wrench should not be used to turn a ½in. pipe, because the leverage would strain the thread; a 12in. to 14in. wrench would be more suitable.

When cutting pipe with either a hacksaw or pipe-cutters the tool should be held square to the work, as shown in Fig. 28, and the work should be clamped firmly in the vice. After cutting, particularly if a wheel-type pipe-cutter is used, the end of the pipe must be reamed or filed out to remove all burrs and restore the opening in the pipe to its original diameter. The removal of burrs from the outside and the provision of a small bevel on the cut edge give lead both to the dies when screwing and to the finished thread, which helps in starting the thread in fittings. A hacksaw can be used dry, but a wheel-type cutter requires oil to keep the cutters trim. Hacksaw blades with fine teeth (20 to 28 per inch) are better suited for cutting pipe, as the teeth are less liable to tear.

When a pipe is screwed with stocks and dies the dies should be the right size for the pipe. If adjustable dies with loose chasers are used, the adjustment should be checked. The tail guide in the dies must also be the correct size, otherwise a crooked or drunken thread will result.

Fig. 29 shows the hand action used in screwing ¾in. diameter pipe with dies with fixed chasers. The dies must be pressed hard against the pipe while being turned in order to start the thread. A light engine oil should be

CUTTING, SCREWING, AND JOINING PIPES

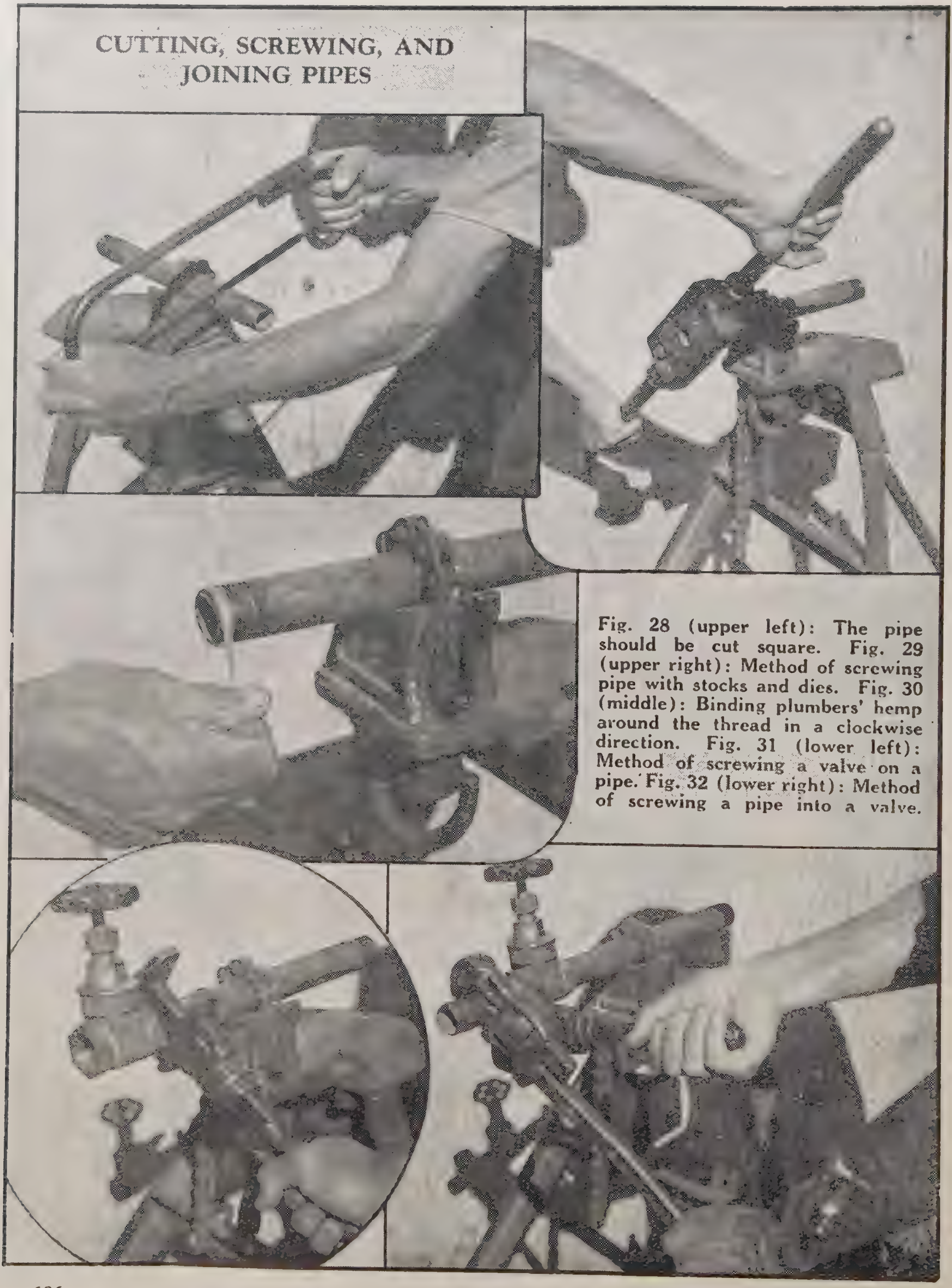

Fig. 28 (upper left): The pipe should be cut square. Fig. 29 (upper right): Method of screwing pipe with stocks and dies. Fig. 30 (middle): Binding plumbers' hemp around the thread in a clockwise direction. Fig. 31 (lower left): Method of screwing a valve on a pipe. Fig. 32 (lower right): Method of screwing a pipe into a valve.

used freely to lubricate the dies while cutting. As the length of thread required for normal fittings on any size pipe is generally slightly more than the depth of the dies, it is not necessary to remove the dies to measure the thread; sufficient thread will have been screwed on when the back of the dies is just past flush with the end of the pipe.

When the pipe has been cut and screwed and before fittings are applied the pipe thread should be painted with thick red-lead paint or treated with pipe-joint compound and a wisp of plumbers' hemp wrapped round the thread in the direction of its travel, as shown in Fig. 30. The hemp should be smoothed out on the pipe with the fingers so that the paint or compound impregnates the hemp strands. This treatment for pipe threads should also be applied to the jointing of pipes already threaded. The sockets and keeps of the pipe should be removed, the sockets and pipe threads cleaned, and the pipes blown out. After treatment of the male threads with paint and hemp the pipes can be coupled together with the sockets. The female thread is sometimes treated with paint as well as the male, but this practice is not recommended, as an accumulation of paint may be pushed into the fitting and set hard before the water is turned on, thus restricting the flow and increasing friction head.

Fittings such as T pieces, elbows, and bends can be screwed on to a pipe without any special precautions, but such parts as valves must be handled more carefully. Fig. 31 shows how a valve should be screwed on to a pipe. The valve should be gripped by the hexagon nearest the pipe; if the valve is gripped by the outside hexagon, the strain may distort the valve body and damage the mechanism. Fig. 32 shows the correct method of screwing a pipe into a valve. The strain should be taken with a wrench held on the hexagon nearest the pipe being screwed. The walls of some fittings are very thin and care must be taken to avoid distorting them.

When pipe runs are completed the pipe should be washed out well before the outlet control is fitted, as a blockage through dirt and chips when the service is in operation can be very annoying and may cause damage to tap washers.

General Precautions

In installing pipe runs care should be taken to guard against airlocks (high points with no outlet where air can be trapped). This is particularly important on pump suction pipes, which should have an upward slope from the foot valve to the pump. Unavoidable airlocks on normal runs can be minimised by the provision of air valves at the high spots. Air travels upward through water and, being compressible, can cause surging and water hammer.

The possibility of excessive and dangerous pressures should be guarded against. Pumps working against high heads and hydro-pneumatic pressure systems with a reciprocating pump should always be provided with a pressure relief valve installed on the discharge side of the pump between the pump and any check or stop valve. The pressure relief valve should be inspected at least twice a year to ensure that it is always in working order. If a pipe is run from the valve back to the source of water or to a drain, flooding of the pump location will be avoided.

Electric motors driving pumps should be equipped with overload and no-volt release switches.

Pumps with long suction lines will probably require a snifting valve to permit the entry of a small quantity of air to facilitate valve cushioning. An air vessel on the suction side as well as on the delivery side can also be an advantage in such cases.

When pipes are laid in a trench the filling in of any section of the trench should be delayed until the water has been turned on at full pressure. This allows leaks to be detected readily and avoids the necessity of reopening the trench.

"Weeping" (drip leaks) at screwed joints should cause no anxiety, as small percolations of water through a dry joint usually take up when the pipe is under pressure.

Purification of Water

As the provision of an adequate supply of reasonably-pure water is essential to the maintenance of life, the importance of purification cannot be over-emphasised.

Impurity in water may be organic or inorganic and may occur either in suspension or solution. Though many substances and various types of bacteria may be present without constituting any danger to health, the presence of disease-bearing germs can render water affected highly dangerous.

When present in water in such quantity as to be dangerous inorganic impurity is often distinctly perceptible to the senses. For example, various salts render water hard and nauseating, and many of the iron compounds are obvious in both taste and colour.

Generally ground water taken from certain depths is sufficiently free from bacteria to be safe because of the natural filtration that occurs in its percolation through the ground, but surface water must always be regarded with suspicion.

As most of the bacteriological contamination of water may be traced to human or other organic pollution, it is obvious that purification of a water supply becomes a serious problem when the density of human beings or animals is high.

Water to be fit for human consumption must be free from suspended

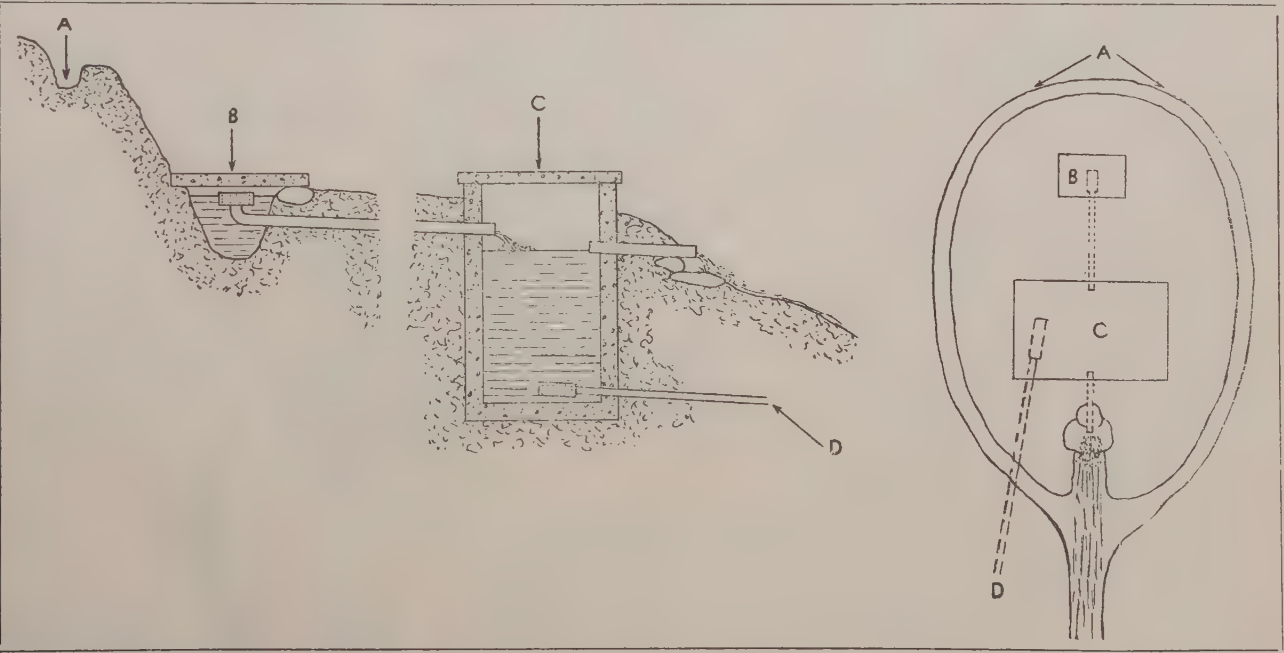

Fig. 33—Storage basin for a weak spring. Left: Sectional view. Right: Plan. A—Diversion ditch. B—Spring. C—Reservoir. D—Pipe to buildings.

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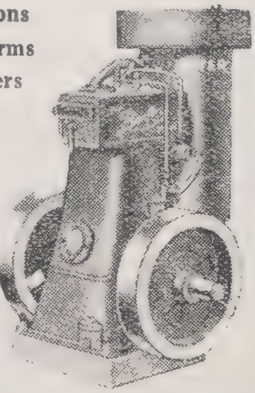

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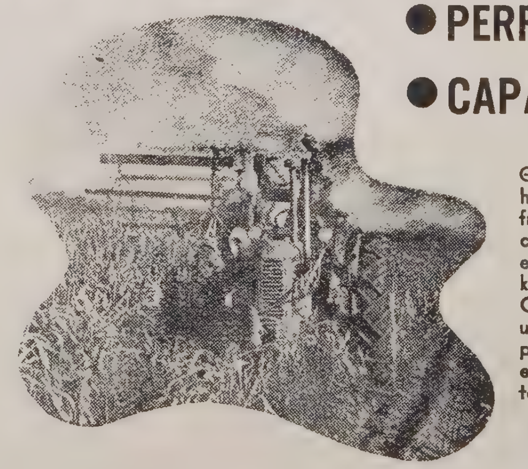

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matter, colourless, odourless, agreeable to the taste, and must contain no disease-bearing bacteria.

Bacteria may be either removed from water mechanically by filtration or destroyed. A large part of the matters in suspension may be removed by passing the water through sedimentation tanks, in which the matters are deposited by their own weight. The most finely-divided suspensions, however, are the bacteria which, except those carried to the bottom of the tanks with the heavier suspended matter, cannot be disposed of in this way.

For their successful operation filtration processes largely depend on the formation of a sediment layer on the surface of the filtering media, and group themselves into two classes—slow gravity filters and rapid gravity or pressure filters. With pressure filters, chemicals are usually added to the unfiltered water to produce an artificial layer of sediment rapidly, and the filtration may be much more rapid than in the case of the older, gravity-fed sand filters.

The destruction of the bacteriological content of the water is done by chemical sterilisation. Numbers of chemicals have been used with varying degrees of success, one being chlorine in the form of chloride of lime. The introduction of free chlorine compressed in cylinders in liquid form simplified its application as a sterilising agent.

Automatic chlorinating plant is now available that will chlorinate water accurately for any demand. As the dose of chlorine is on an average appreciably less than 1 part in 2 million parts of water, the quantity of chlorine gas used is very small.

Chlorine in sufficient quantity is an absolute sterilising agent, but because raw water may vary materially and rapidly in quantity of matter in suspension and organic content, a varying proportion of free chlorine is consumed in the oxidation of these substances. To ensure the continuous destruction of all bacteria it is therefore necessary to treat the water with an excess of chlorine, and this excess may become apparent in taste and smell. Thus in a water supply for domestic purposes chlorine is best used as a preliminary to subsequent treatment in filters, as the rate of dosing should be restricted to a maximum which does not make the water at all objectionable to taste or smell.

Where a water supply is fed from a river, creek, or well every precaution must be taken to ensure that pollution cannot occur or that disease-producing germs are carried into the water supply from drainage or other sources. If this possibility exists and cannot be eliminated, the installation of sterilising plant would be wise.

Increasing Inadequate Water Supplies

If the existing source or sources of water are inadequate, the supply may possibly be increased in a number of ways. The suggestions listed below should remedy the main causes of inadequate supplies of water.

Weak Spring

The flow from a spring may be weak for one or more of the following reasons:—

1. Spring located above the dry-weather water-table.
2. Spring hole not well cared for.
3. Spring flow dammed up.
4. Water being lost in the soil around spring.
5. Water being drained away to another well or spring nearby.

If the spring is located above the dry-weather water-table or the water is being drained away to another well or spring nearby, there is no remedy except to use another source.

The obvious remedy for a spring that has not been well cared for is to clean the hole and prevent the water from leaking away. If the vein becomes covered with mud and leaves, the water may be diverted to other outlets. If the soil at a spring is porous, the water may sink as it flows from the vein, and this may be obviated by providing a watertight catch basin.

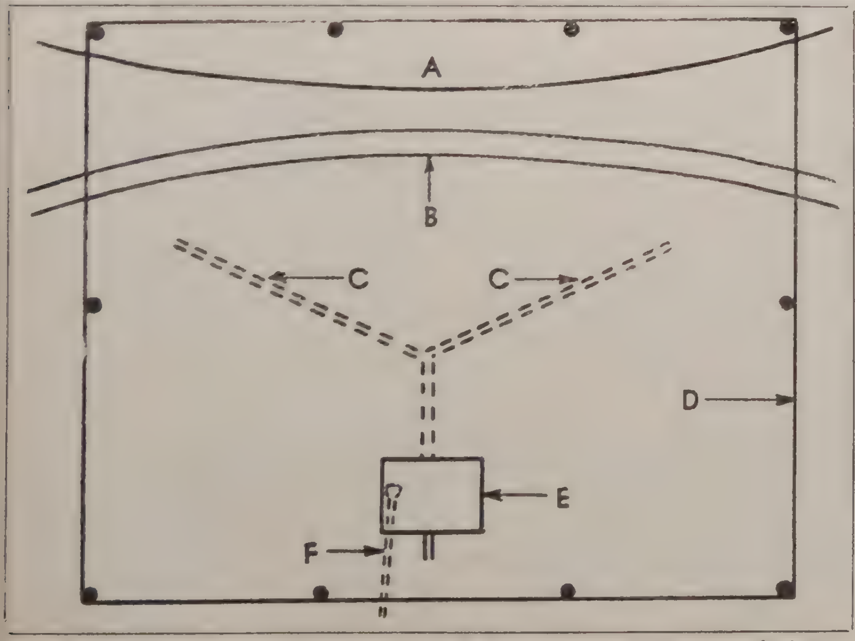

Fig. 34—Use of drain tiles for collecting spring water. A—Foot of slope. B—Diversion ditch. C—Porous tiles. D—Fence. E—Reservoir. F—Pipe to buildings.

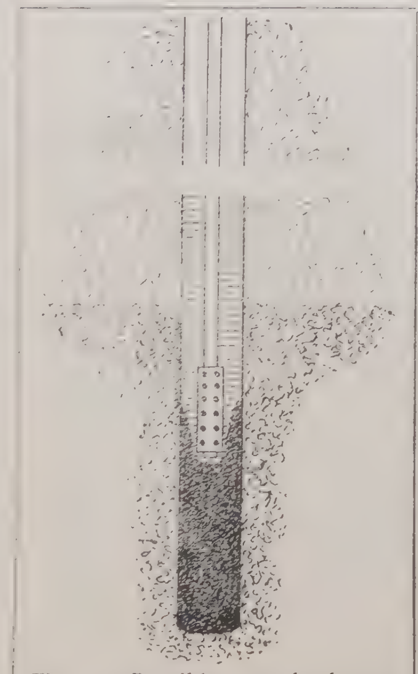

Fig. 35—By silting up the bottom of a drilled well sediment can restrict the flow.

The damming up of a spring is caused by an improperly-constructed storage basin. Many springs are located along the edge of layers of bed rock over or through which the water flows to the spring, and the spring may be caused by a low place or crevice in the rock. In such a case the damming up of the water may divert it to some other outlet. The storage basin for a weak spring should be located far enough below the spring to permit free flow from the spring, as shown in Fig. 33.

Where water is being lost in the soil around the spring a collecting tile should be used as shown in Fig. 34. Sometimes the water seeps out of a layer of rock along a considerable distance at the foot of a slope, forming a bog or swamp in the area of the spring. Drain tiles arranged as shown will collect this water and direct it to the spring. The tiles should be laid in gravel at a depth of 4ft. and covered with heavy clay to keep out surface water. The entire drained area should be fenced to keep out stock, and a diversion ditch should be dug above the area to divert surface water.

Inadequate Well

A well may be inadequate for one or more of the following causes:—

1. Not deep enough to penetrate water-table, or below free-ground water-level.
2. Filled with mud.
3. Not enough storage capacity.

If a well is not deep enough to penetrate below the dry-weather water-table, it will become very weak or dry up in dry weather. Generally in regions where wells are common an adequate supply of water can be obtained if the well is dug or drilled deep enough. In some locations there is danger of striking salt, sulphur, or objectionable minerals at great depth, but usually at least the quantity of water can be increased. If the well has been dug, the best method of going deeper is to drill through the bottom. In drilled wells the old hole may be extended by additional drilling.

If the well is old, the flow may be obstructed by an accumulation of sediment in the bottom. In a dug well this may be bailed out with a bucket, but in drilled wells a well-driller's bail should be used after the drop pipe has been removed. It is never safe to "shoot" a well with explosives, as there is just as much danger of losing the existing supply as there is of increasing it. Fig. 35 shows how sediment in the bottom may restrict the flow in a drilled well. The use of explosives in any attempt to clear it might force the sediment into the water-bearing stratum, thus clogging the pores and further decreasing the flow. Moreover, explosives may open cracks in the bed rock and allow the water to flow away from the well instead of into it.

If the well has not enough storage capacity, its diameter, depth, or both should be increased, though in some cases it is cheaper to dig another well.

Roof Catchment of Rain.

An inadequate supply of water in a system of roof catchment of rain may be caused by:—

1. Not enough tank capacity.
2. Not enough roof area to catch water.
3. Gutters and down-spouts in poor condition.
4. Not enough rainfall.
5. Leaks in the tanks.

Sometimes the area of roof used for catching water is insufficient to give an adequate supply. This can be remedied by providing additional gutters and down-pipes on the remainder of the roof.

The only remedy where the rainfall is inadequate is to provide additional roof area and storage to catch and hold what rain does fall. Nowhere in New Zealand is the annual rainfall insufficient to provide an adequate water supply if sufficient roof area and storage are used.

Supplementary Supply

Any inadequate water supply can always be supplemented by drawing water from two or more sources to supply the one system. For example, if a lake, pond, or stream is available either for gravity flow or for pumping, it can be tapped to increase the supply from an inadequate well or spring, though two pumps and two separate piping systems should be used so that the well or spring water can be used for domestic or any other purpose requiring good water and the lake, pond, or stream water can be used for watering stock, sprinkling, irrigation, or sewerage if water-closet drainage is installed. A rain-water supply for domestic purposes can be used in this dual method.

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A HOME-MADE TRACK GRADER

By A. J. LYNCH, Assistant Instructor in Agriculture,
Department of Agriculture, New Plymouth.

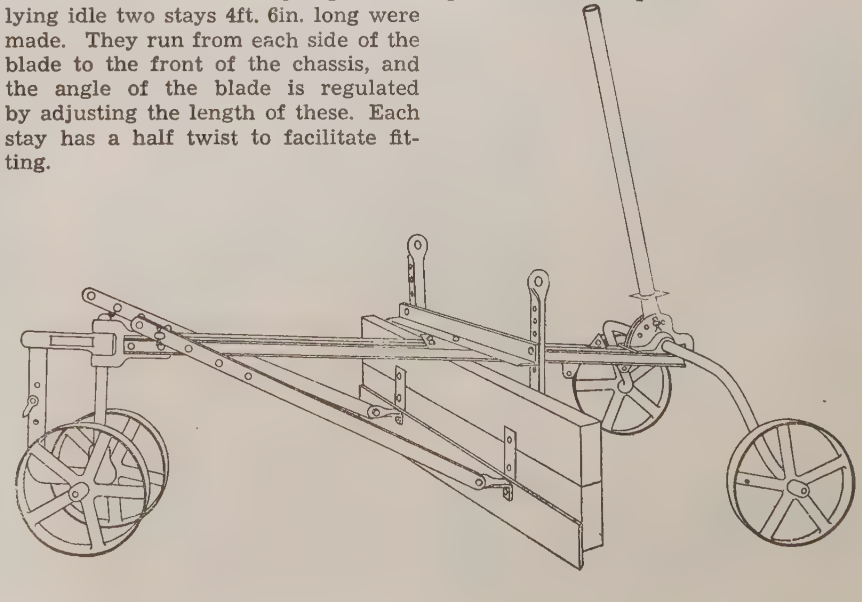
MOST farm implements contain a few sound parts which fall into disuse when the implement is discarded, but such pieces of derelict machinery can often be resurrected from the scrap heap and put to good if novel use. The efficient farm track grader illustrated was made by Mr. L. George, of Tarata, Taranaki, from parts of sets of disc harrows and other odd pieces of machinery.

THE essential difference between the new machine and the original is that a grader blade is now carried in place of the set of discs, but that required some improvisation on the part of the maker.

The blade, an old one salvaged from a road grader, is bolted to two 6ft. planks of 8in. x 3in. timber butted edge to edge. The cross-piece which originally supported the discs now supports this blade by a vertical strap of 2in. angle iron (also parts of a disc set) at each end. The attachment of the vertical straps to the cross-piece is adjustable so that the blade can be worked at different depths.

The grader blade must also work at different angles to the direction of travel and must therefore pivot at a central point. A 12in. x 8in. steel plate is bolted to the top of the chassis directly under the cross-piece, and a steel bolt passes through a central hole in plate and cross-piece. This is the only direct attachment of the cross-piece to the chassis. However, the blade must be supported at each side or it would pivot freely on this plate, and from some old car springs found lying idle two stays 4ft. 6in. long were made. They run from each side of the blade to the front of the chassis, and the angle of the blade is regulated by adjusting the length of these. Each stay has a half twist to facilitate fitting.

Mr. George's farm is broken and many hillsides are excavated for cattle tracks. In the winter and spring they cut up badly and as a result are very rough in summer, but with this grader they can be levelled off and used safely by all stock and farm vehicles. The problem of keeping clay races and tracks in good order is present on many farms. This machine is very efficient and of very light draught even on hard papa-clay tracks, and the cost of construction was almost negligible, as it was made entirely from disused parts of other implements.



Value of Barberry Hedges for Farm Shelter

By W. H. FISHER, formerly Assistant Instructor in Agriculture,
Department of Agriculture, Auckland.

FROM the farmer's point of view barberry has many advantages as a hedge plant: It is easily established, it provides very good shelter, it is an effective barrier to stock, and it does not require double fencing. Provided barberry is attended to annually, trimming is not a very big item. It makes a neat hedge, and is not eaten by stock. Barberry does best in a free-draining soil, and it requires a good average rainfall. It can withstand moderate winds, but if subjected to strong winds, it tends to lose its leaves and, therefore, its value as shelter. It is most important that barberry should not be planted near the sea coast, because salt spray is likely to have a detrimental effect on the plant.

BARBERRY is more suited for inland districts, and the extent to which it is used in the Waikato and the Tamaki area gives an indication of its popularity on the lighter soils in dairying districts. On well-drained, well-consolidated peat swamps barberry has done very well, and it is not harmed by fairly cold temperatures.

Establishment

Common barberry is grown from seed and seedless barberry from cuttings. Farmers often raise their own plants, either from seed or from cuttings, both of which strike readily, but the commoner practice is to purchase requirements from nurseries.

Everything possible should be done to give plants a good start after setting out. A good, well-worked site is essential, and this good cultivation should check weed growth for the first year. It has been the practice of some farmers when putting out the young plants (about 1ft. apart) to establish them directly below the bottom wire of the fence line. The argument in favour of this method is that where it is intended to graze stock up to the fence plants will have protection from the fence and will not be trampled on by stock. Some farmers, however, prefer to plant barberry a short distance (about 1ft.) from the fence, which makes planting out and subsequent weeding easier, but has the disadvantage that it exposes plants to trampling by stock. Plants which are killed have to be replaced to maintain a uniform shelter belt.

A good, well-developed, healthy plant ready for planting out in its permanent position.

Another method of planting barberry is first to remove the topsoil, placing the sods to one side; then to take a further spit of subsoil and place it on the side opposite to the sods; and finally to replace the sods in the trench and chop them up with a spade. A liberal dressing of cow manure, compost, or some other organic fertiliser should then be applied. Where the ground is worked up in this manner it should be done in March or April and the ground left until planting in June or July. Before planting, the trench should be worked up a little, some of the subsoil replaced, and the plants set in so that the roots are placed in the rich mulch. The plants should be put in position, the ground around them firmed with the foot, and the remainder of the subsoil replaced. If the clay subsoil is placed on top, it will check weed growth considerably for about a year, and the young plants will get a better start. In the early stages barberry will not stand weed invasion, and particularly competition from grass. Young plants

A neat appearance is obtained when barberry is trimmed when the shoots are young.

Young barberry plants grown from seed in a nursery.

should be kept weeded or mulched with cow dung.

In establishing barberry it has been found that well-grown plants, preferably 2 to 3 years old, give the best results, few replacements being required. To make planting easier it is desirable to cut a few inches off the tops and roots.

Saving Barberry Seed

Barberry seed is quite easy to save. Well-ripened berries should be stripped from an old-established hedge which appears healthy and pulped. Fermentation should be allowed to set in, the scum on the surface being removed as it forms. Good seed will fall to the bottom of the container holding the pulp, but inferior seed will come to the top and can be discarded.

Shelter Value

Barberry provides a dense shelter, but if neglected and left untrimmed for many years it tends to become open at the base and the upper branches are inclined to arch over and cover a large area which should be providing feed.

Provided that it has been well trimmed in the early stages, barberry can serve as a "live" fence—the original wire fence having been removed piecemeal, according to the stages of growth of the hedge. Usually, however, the original wire fence is left.

In the first year or two it is generally inadvisable to trim a barberry hedge, though no hard-and-fast rule can be applied, and a very light top trimming may be beneficial. A light top trimming will assist more vigorous growth of shoots, thicken the hedge, and improve its development. When a barberry hedge is 3 or 4 years old an annual trimming will probably be sufficient to encourage a dense bottom growth and ensure evenness. It is advisable when cutting back old hedges which have been neglected to trim one side each year to ensure that the hedge remains stockproof.

Seedless Barberry

Seedless barberry has several advantages over the common variety. It is quicker growing, much hardier, and will cope with damper and heavier soil conditions, but it is inclined to lose its leaves in winter when shelter is of prime importance. Because seedless barberry has to be grown from cuttings it is much more expensive than the common variety, but it has the advantage that it cannot be spread by birds.

In sparsely-populated areas common barberry has become a menace through the seed being carried by birds, and where this is likely to occur it is recommended that the seedless variety should be planted.

Cuttings of seedless barberry should be taken from new wood and planted in a nursery. After a year or two the plants can be set out in their permanent positions, allowing 2ft. between plants, as the seedless variety tends to thicken up more quickly than the common barberry.

Poisoning of Cattle by Fescue Seed Cleanings

IN view of the approaching grass-seed harvest season, warning about the disposal of seed cleanings from dressing plants is desirable. In June, 1948, a serious mortality occurred in cattle, 24 out of a mob of 30 being lost in the course of 5 or 6 days.

The cattle had the run of about 320 acres of pasture, and a week or so before the incident they had access to a paddock which contained a heap of fescue seed cleanings from a seed-dressing plant. The cleanings came from seed which had been dressed a second time, less than a month previously. There was ample evidence that the cattle had been eating the cleanings.

The symptoms were similar in each case and were nervous in type. The affected animals exhibited muscular inco-ordination with complete loss of control. Considerable convulsive movements took place, with muscular twitchings and tetanic spasms, in cattle that were down. Death was due to exhaustion and paralysis of the brain centres.

Cattle of all ages were affected and 9 pregnant females aborted, 8 of these being included in the deaths.

Sudden Onset of Symptoms

That the case was one of poisoning was suggested by the sudden onset of symptoms, the number of animals of varying ages and sex similarly affected at one time, the rapid abortion of the pregnant animals, and the short time elapsing after the onset of symptoms before a fatal termination.

The case was confirmed by feeding the fescue seed cleanings to a cattle beast, which died after showing the same type of nervous symptoms.

There are evidently factors which may affect seed cleanings, because under general conditions the same outbreaks resulting in such a high mortality have not invariably occurred.

Nevertheless sufficient is established to warn those farmers concerned to destroy the heaps of fescue cleanings from seed-dressing plants and to prevent stock having access to them.

—*C. V. DAYUS,*
Livestock Superintendent,
Department of Agriculture,
Dunedin.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in March as under:—

Auckland—1YA, on March 22, at 12.35 p.m., "Topical Discussion Recorded in the Field," by H. E. Clark, Supervisor, Auckland District Pig Council.

Wellington—2YA, on March 17, at 12.35 p.m., "Housing and Sanitation," by I. H. Owtram, Supervisor, Taranaki District Pig Council.

HEADING PHOTOGRAPH: A high standard of management is necessary to obtain the optimum results from prolific sows. This litter reared by a pedigree Large White sow easily repaid the time and attention given to it.

Better Sow Management and More Sows Needed

By A. LONGWILL,
Assistant Superintendent of the Pig Industry,
Department of Agriculture, Wellington.

SINCE the lifting of meat rationing in New Zealand it has become apparent that consumers do not like the overfat bacon produced from the average type of baconer taken to weights in excess of 160lb. dressed carcass. This is also true in Britain, the export market for New Zealand pig meat. To maintain both the local and export markets and secure the maximum profit the producer must therefore give heed to the demand for quality and plan his management so that he markets the type of carcass required. This means the production of more average-weight baconers and to achieve this next season more pigs must be bred for dealing with the flush of feed in spring and extra sows must therefore be mated now.

BETWEEN 1936 and 1948 the numbers of breeding sows in New Zealand fell from 116,000 to 66,000. Though the amount of feed from dairy by-products and meals has decreased because of changes in dairy manufacture and the after effects of the war, it has not been the sole reason for such a serious drop.

The trend from porker to baconer production, which was evident even before the war, was beneficial as far as it followed the increased local demand for bacon. The production of a high proportion of the output as bacon is recognised as desirable in the stability of the pig industry of most countries. However, before the war the strongest demand for New Zealand pigs in the United Kingdom was for 60 to 80lb. porkers, and the increase in consumption on the local market was built up on the basis of a considerably-lighter side than the average being produced today.

The conditions of marketing which have prevailed during and since the war have encouraged the trend to the production of heavy-weight baconers, but with meat rationing abolished, the consumer refuses to accept unwanted grades of meat and is prepared to pay more for the quality desired. This has resulted in the local trade ceasing to be interested in the heavy-weight baconer, which means that if the pig producer wants to maintain the level of bacon consumption in New Zealand, he must supply the article for which there is a strong demand. Furthermore, on the export market the quality of his baconers must compete with that of the best producers in the world.

Today only about 20 per cent. of the total baconer kill is exported. Local curers will continue to compete for medium-weight baconers, but will tend to leave the heavy pigs, which are unsuitable for their trade, to be dealt with by exporting firms. Though a few of these heavy pigs are undoubtedly of good bacon type and are quite suitable for the bacon trade in some areas of the United Kingdom, most are too fat and normally could be disposed of only at a considerable discount.

All the information that can be used as a guide to future production policy indicates that for both the local and export markets definite weight ranges should be the aim. These are 60 to 90lb. carcass weight for porkers and 130 to 160lb. for baconers.

The average weights of pigs killed must be reduced without decreasing the total tonnage of pig meat produced, which means more pigs will have to be slaughtered. This can be done either by using the present number of sows more effectively so that more than 9 pigs per sow, which is the present average, are slaughtered or by carrying more sows.

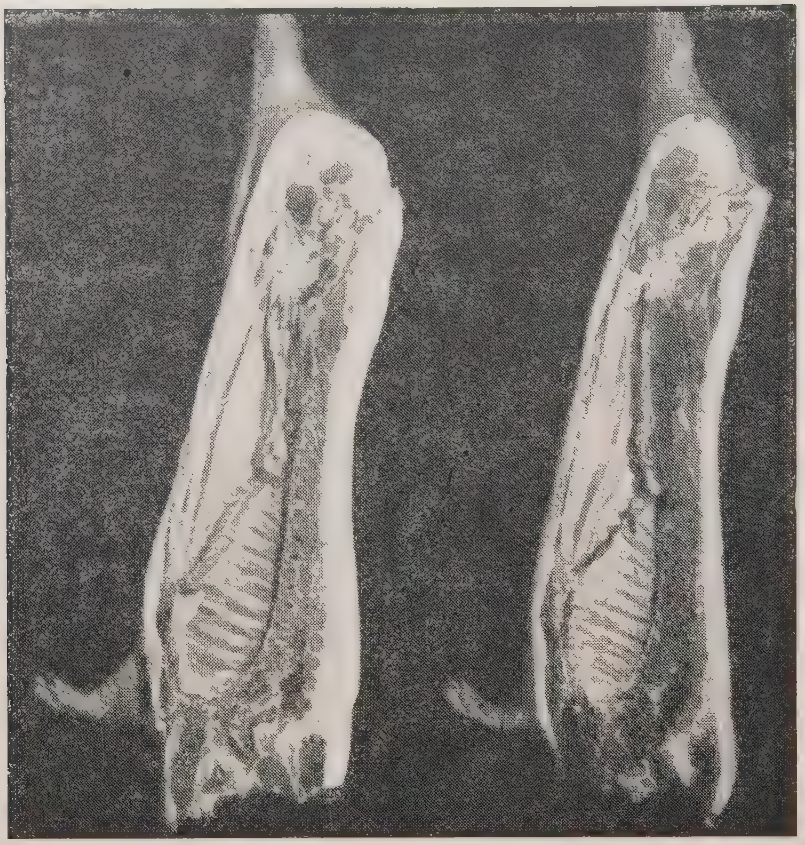
The more effective use of sows would tend to improve efficiency in the industry and all efforts in improved husbandry are desirable. By this means alone the additional fat pigs required could be produced. The way of achieving this result has frequently been dealt with in the "Journal" and is briefly summarised below.

Selection of Breeding Stock

The aim must be to build up a sow herd of good mothers with high milking capacity. Litter recording has been established on a recognised basis to assist farmers in this respect. It plays the same part in improving the results obtained from the sow herd as herd testing does in improving butterfat production, with the very important addition of enabling selection to be made for prolificacy in the sow. The number born in the litter, the number weaned, and total litter weights at 3 weeks and 8 weeks are recorded, and though all these factors are influenced by management, the records, properly interpreted, are the soundest basis for selection for the productive qualities of prolificacy and mothering and milking ability in breeding sows.

Though the farmer raises his own replacement sows, he can improve the basis of his selection by a system of recording litter performance. As all the sows are under the same management conditions, the complications which occur when comparing performances of sows on different farms do not arise. When purchasing replacements the farmer should make use of the knowledge and ability of his district pig council supervisor to interpret such pro-

MANAGEMENT OF BREEDING SOWS



[*Sparrow Industrial Pictures Ltd. photos.*

Though some pigs of 160lb. carcass weight or more are of desirable finish, most are too fat, as is shown by these sides from average pigs of 170lb. (left) and 155lb. (right).

duction records as are available as a guide to the value of stock being offered for sale.

Management of Boar and Sows

The management of both the boar and sows should be designed to keep them in healthy breeding condition. The sow follows a cycle of building up and using up body reserves and at weaning her surplus condition should have been milked off and she should be at her leanest phase of the whole cycle. If she is in really-low condition, she should be well fed as soon as she has dried off so that she recovers reasonably-good condition in about a month. To do this she will require up to 10 gallons of skim-milk or its equivalent per day, depending on the quality of grass or other foods available. In any case the dry sow in low condition should not be turned out to compete for her share of food with the heavier and more aggressive sows. Feeding bails in the dry-sow paddock which enable sows to be fed individually so that the condition of each can be properly regulated are a distinct aid to good sow management and should be used more widely.

The general principle should be to secure gradual improvement in condition throughout the gestation period under conditions of adequate grazing and exercise. To enable the litter to be born as well developed and as strong as possible protein-rich feeding is desirable during the last 6 weeks of pregnancy. This should consist of 4 gallons of skim-milk or, in its absence, 2lb. of meat meal per day as a basis, together with grazing or other foods available.

The boar should have constant exercise and be fed to maintain a level standard of good, firm condition, but should not be allowed to become fat. If services are concentrated in a relatively-short period, they should be controlled. The first service should be delayed until the sow has been on heat for about 30 to 36 hours and another service given after a further 24 hours. Because it is not certain whether the eggs produced in the ovaries of the sow are released in a fairly-short period during heat or over the greater part of the heat period, as was previously supposed, it is advisable to allow two services, but if more sows have to be served within a few days one service per sow at 36 to 48 hours from the start of heat is likely to give the best result over all litters.

Design of Farrowing Quarters

Well-designed farrowing quarters should be provided and the sow accustomed to them about 14 days before the date of farrowing. The essentials of a farrowing unit are a well-ventilated but draught-proof house with an 8ft. x 8ft. sleeping floor fitted with a farrowing rail. Roof height should be adequate for convenience in getting in to handle the sow if necessary and for cleaning out. A railed-in feeding yard and creep, all concreted, should be attached to the house and if, as is recommended, winter farrowing is practised, it will be an advantage to have the creep roofed over so that suckers are not delayed by bad weather in starting on the creep.

Health of Sow

The action of the sow's bowels should be kept regular and her general health promoted. During the last few days of pregnancy a reduced, light diet should be given and on the day of farrowing water only. If the sow has been well fed during pregnancy, there will be no need to feed her heavily for some days, and the milk can be increased gradually until after about a fortnight she is getting 6 gallons of skim-milk for her own maintenance plus 1 gallon for each piglet in the litter. Under this management there is less danger of losses than if the sow has been semi-starved during her gestation period and an attempt made to remedy the defect at the last minute by heavy feeding just before or just after farrowing.

Farrowing and the day or two following are the critical times when the danger of losses is greatest. Special attention at this time will pay dividends.

Despite careful management, however, losses are likely to occur, and with the present level of sow population the number of pigs available in spring, when the demand is greatest, is likely to be inadequate. Even those farmers who are getting litter results better than average will find it profitable to breed from one extra sow to supply this demand. If the farrowing for this purpose is planned for May and November, the market for slips or stores from the first litters and weaners from the second should be highly profitable. It is too late to mate an extra sow now for May, but if one is mated for June or July farrowing, its pigs may enable an earlier-born litter to be disposed of or they themselves may be sold on the spring market.

If the pigs are given a good start on the creep, they may be weaned at 6 weeks and the sow mated again to bring the second farrowing back to November-December. These pigs will make porkers before the end of the season and will be in good demand.

There is some prospect of a little more concentrated food being available for pigs during this winter and for next season. The production of more pigs, lighter baconers, and quality carcasses is possible and the aim must be better management of the sows in use and carrying of the additional sows that can be efficiently housed, fed, and managed.

SEEDS MIXTURES FOR SECONDARY BURNS SOWINGS

SEASONAL NOTES contributed by the EXTENSION DIVISION

ALTHOUGH secondary growth and manuka are often cut at all times of the year, it is generally recognised that summer cutting followed by an autumn burn gives the best results. Such a programme allows for rapid drying of the cut material, together with a minimum loss of leaf, which is of such importance in the carrying of a good fire. It also enables the seed to be sown on a good bed of ash at a time when rapid germination of the seed sown can reasonably be expected.

THE species comprising the mixture to be sown are of great importance. Nothing is gained by endeavouring to establish grasses and clovers under environmental conditions unsuited to their particular requirements for persistency and productiveness. High fertility demanding species such as ryegrass and white clover succeed only on naturally-fertile soils or where any deficiencies can be rectified by topdressing, liming, etc. The requirements of the chosen species must conform with the conditions under which the pasture is to be established and utilised, and on much of the low-fertility country grasses such as danthonia and browntop are very valuable.

The factor of quality should need no emphasis, yet it frequently receives scant regard when seeds are being selected for hill-country mixtures, apparently because of the misconception that difficult, low-fertility conditions do not warrant the extra expenditure on quality seed when so-called cheap seed is available at "less than half the price."

Low-priced seeds mixtures, unless supported by reliable information about origin, purity, germination, and the proportions in which species are included in the mixture, should be viewed with the utmost suspicion. Purchase of such seed should be deferred subject to receipt of a satisfactory official analysis of a representative sample of the mixture. The Seed-testing Station, Department of Agriculture, Palmerston North, provides this analysis and purity and germination-testing service free of cost to those farmers who wisely safeguard themselves by submitting doubtful seed for analysis before purchase.

Secondary Burn Mixtures

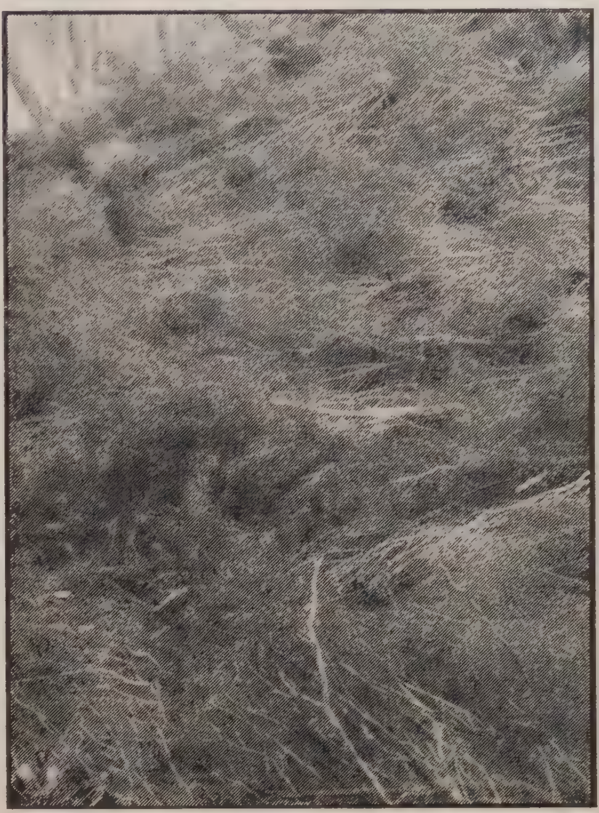
Though the wide diversity of hill-country conditions as influenced by varying soil types, topography, aspect, altitude, climate, etc., precludes the use of one standard seeds mixture fulfilling all requirements, it is possible to be guided by basic mixtures drawn up in accordance with requirements under high- and low-rainfall conditions. Annual rainfall and its seasonal distribution largely determine the grasses and clovers best suited to the locality and the types of secondary invasion causing pasture reversion.

In high-rainfall areas where bracken and hard fern, rain-forest secondary growth, and manuka are the principal invaders the following basic mixture serves for guidance:—

	lb. per acre
Perennial ryegrass (Certified)	8
Short-rotation ryegrass (Certified)	3
Crested dogstail	4
Browntop	2
Danthonia pilosa	2
White clover (Certified)	2
Lotus major	1
Total	22lb.

For country of sunny aspect, especially on sandstone soil types in warm areas, *Lotus major* should be reduced to ½lb. and 2lb. of subterranean clover added. *Poa pratensis*, 1 to 2lb., should be added for steep, sunny slopes. On the more fertile soils where the ash after the burn is deep; where soil is heavily worm-casted, and especially where topdressing is possible omit *Danthonia*, increase perennial ryegrass to 10lb., and add 4lb. of cocksfoot. For moderately-steep slopes in cold districts add 2lb. of timothy.

For low-rainfall areas where manuka and, to a less extent, gorse and broom may prevail the base mixture is as follows:—



In secondary growth burns the best results are usually secured by burning some 6 weeks after cutting. This allows a good fire to be carried before the leaves fall off.

	lb. per acre
Perennial ryegrass (Certified)	8
Short-rotation ryegrass (Certified)	3
Crested dogstail	3
Danthonia pilosa	3
Browntop	1½
Subterranean clover (Mt. Barker or Tallarook)	3
White clover (Certified)	2
Total	23½lb.

On very dry, marginal country reduce perennial ryegrass and white clover to 6lb. and 1lb. respectively and add 2lb. of chewings fescue. Add ½lb. of *Lotus major* if slopes are mostly shady and 4lb. of cocksfoot on the more fertile soil types.

In the warmer northern districts 4lb. to 6lb. of paspalum may be added to the mixtures, the smaller quantity being used where cocksfoot is also included.

Such a mixture provides the short-lived species such as the ryegrasses which provide valuable feed in the early stages. The most important species in the mixture, particularly where topdressing is not likely to be carried out, are the danthonia and browntop. Both of these are capable of thriving under conditions of low fertility and are therefore extremely important. The *Lotus major* is also valuable, particularly in high-rainfall areas where topdressing is not possible.

With all secondary burn sowings the rate of seeding per acre may be varied, within limits, according to the original extent of reversion, the heavier rates applying where secondary growth was densest and the original sward correspondingly thinner.

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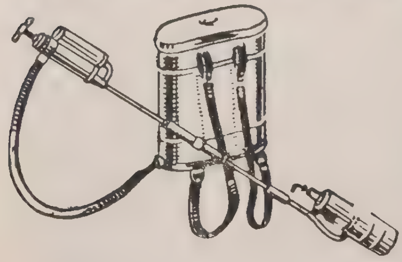

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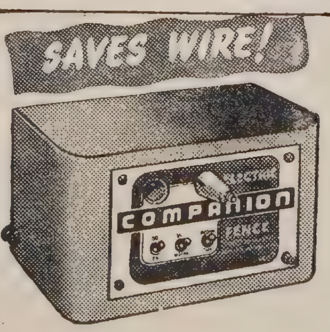

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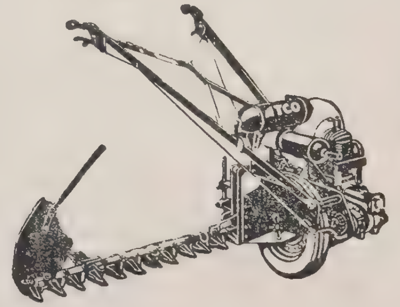

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Sunburn, like any other burn, can be painful and serious. Build up your suntan slowly. For a safe tan commence with a short period of about ten minutes in the sun. Later it will be safe and advantageous gradually to lengthen the exposure to the sun's rays.

Ultra-violet rays from the sun manufacture Vitamin D in the skin. They tone up the skin and benefit the blood. While most suntan oils or creams help you tan safely by filtering out some of the ultra-violet rays, you may still get sunburn if you stay too long in direct sunlight. Over-exposure to the sun, especially when you are exercising strenuously, may also lead to sunstroke or heat exhaustion.

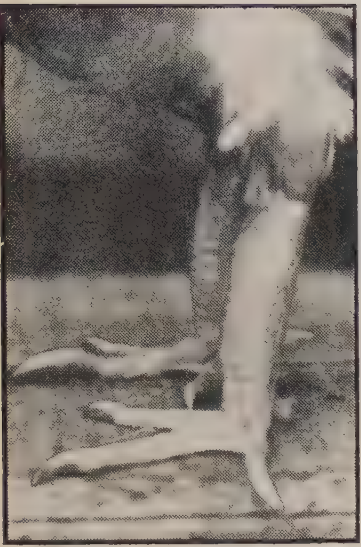
"HEALTH," the Official Bulletin of the Department of Health, is available free to those who are interested in healthy living. If you belong to any women's organisation ask your secretary about it; if not, send your address to the Editor, Box 5013, Wellington.

ISSUED BY THE DEPARTMENT OF HEALTH 13.48

Leucosis of Poultry and Its Control

By R. M. SALISBURY, Veterinary Research Officer,
Department of Agriculture Animal Research Station, Wallaceville.

A SURVEY of all poultry post-mortem reports at the Animal Research Station, Wallaceville, for 1948 shows that 23 per cent. of all specimens received show leucosis of one form or another. As this disease does not usually appear until birds have reached 5 months and seldom appears after 12 months, and as Wallaceville reports embrace all forms of poultry, the incidence in adult birds would be even higher than the figure given above.



Marble bone form of leucosis showing thickened shanks in an affected bird.

LEUCOSIS is a virus disease of poultry and is referred to as complex because it manifests itself in several different ways. These are:—

1. **Nerve form or fowl paralysis,** where the nerves of the legs, wing, or neck may be affected, leading to paralysis of the areas supplied by these nerves.

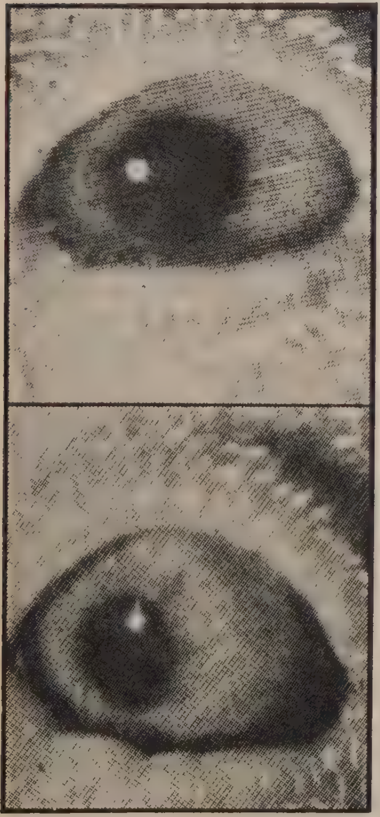
2. **Eye form or pearly eye,** where the iris of the eye becomes bleached out, that is, loses its normal colour and the pupil instead of being clearly defined and rounded becomes ragged and may even assume the slit-like shape seen in cats.

3. **Big liver disease,** where the liver becomes grossly enlarged—sometimes up to 10 times its normal size. Other organs may be affected with tumour-like growths.

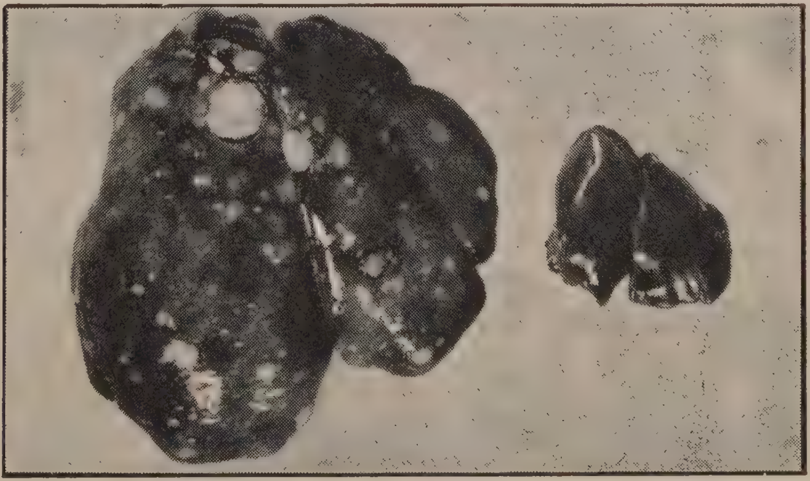
4. **Bone form, osteopetrosis, or marble bone,** indicated by a thickening of the long bones, particularly the shanks.

Evidence shows the disease may be transmitted from hen to chicken per medium of the egg and also from older infected stock to chicks by direct contact. The incubation period would seem to be very long because birds do not usually show symptoms before 4 months of age. Most cases occur at from 6 to 8 months—the time of coming into production. Resistance seems to increase with age and cases are seldom seen after birds are 12 months old. Some strains of birds are more susceptible than others and the converse also applies where resistance of some strains is noted and this resistance is transmitted to the chickens—taking advantage of known resistance is part of the procedure recommended for the control of the disease

The course of the nerve form of leucosis is usually rapid and only a few days from the time the first limp is noted the bird is prostrate or dead. Birds suffering from the eye form usually continue to lay for a considerable time. Where the disease affects the internal organs the course cannot be determined, because no abnormality is apparent until just before death. After its first appearance in a flock leucosis spreads slowly, only a bird or two coming down at a time, but new cases keep appearing so that losses over a year may be high and mortality may range from 10 per cent. to more than 50 per cent. of the flock. Only in rare cases does a bird recover completely after the appearance of symptoms. In America some years ago it was estimated that leucosis accounted for 40 per cent. of deaths after rearing, but the percentage has fallen in recent years. Investigations in New Zealand will, in all probability, produce similar findings, due, no doubt, to the gradual building up of a resistant population of birds, provided of course that the recommended control measures are employed.

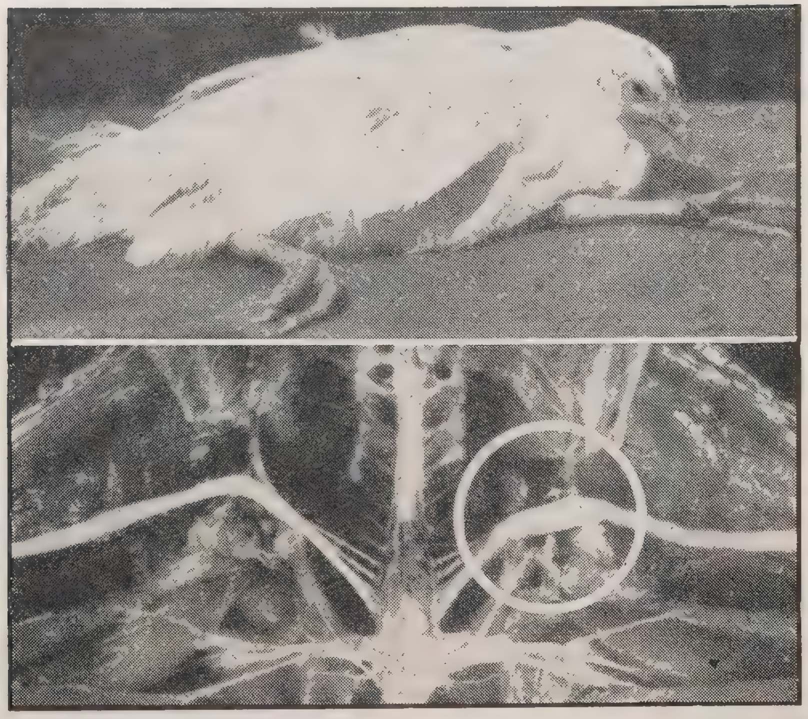


An example of pearly eye (lower), showing distortion of the pupil and greying of the iris, compared with a normal eye (upper).



The big liver disease form of leucosis is shown in the liver at left. At right is a normal liver of a fowl of about the same age as that from which the affected liver was taken.

LEUCOSIS OF POULTRY



Upper—Bird showing typical fowl paralysis. Lower—Post-mortem examination shows enlargement of the nerve supplying the right leg—compare both nerves.

Methods of Control

As no drugs, tonics, medicines, or special feeds have been found effective in preventing or curing leucosis, and because of the nature of the disease, its cause, and methods of spread, the only recommendations for its control are based on a policy of good management and breeding for resistance.

Flock owners should breed from resistant stocks, preferably second-year hens, as the mere fact that they have reached their second year is some indication of resistance. Breeding from pullets, therefore, is not a sound policy. Young stock should be raised in strict isolation.

A high standard of feeding should be maintained and the fowls should be kept under the best possible conditions, because healthy, well-fed fowls are considerably more resistant to any form of disease. As worms are probably one of the chief predisposing factors to disease in poultry, farmers are urged to adopt the procedure of routine treatment for worms at 10 to 12 weeks of age.

Where losses have been experienced and leucosis is suspected dead or affected birds may be forwarded to the Animal Research Station, Wallaceville, for post-mortem examination. Birds should be accompanied by a letter giving a full history of the trouble. Even though the disease is perhaps the most serious affecting poultry in New Zealand today, there is the consolation that elsewhere a gradual diminution in its incidence has been experienced and it is reasonable to expect a similar history in New Zealand.

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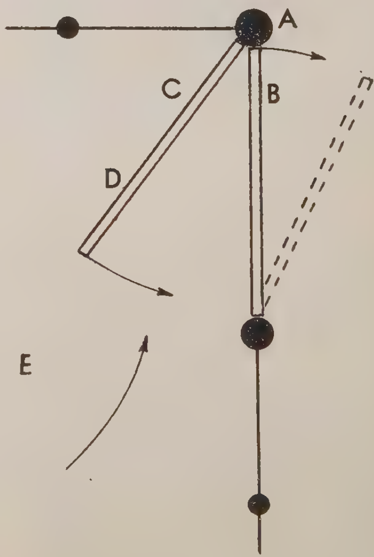
CALF VACCINATION SERVICE

WITH the increasing use by farmers of the Department of Agriculture's service of vaccination of calves against contagious abortion, it is important that avoidable delays which are experienced by officers carrying out the work should be eliminated. Some aspects of the work in which improvements could be effected and a description of a form of race found very convenient during vaccination follow.

Delays which follow the officer's arrival on the farm at the appointed time to find that the calves have not been yarded, or that the lack of facilities offered entails much unnecessary heavy work in manhandling the calves, can be avoided by preparation and co-operation. In areas where farms are close together and calves from several herds have to be vaccinated grouping of the calves on a centrally-situated farm where yarding facilities are available is always appreciated.

The best place for handling calves is in a race high enough to prevent the calves from jumping out and, most important, strong enough to hold them.

Several officers on this work handle the calves by what might be termed the "gate method," which is quick, convenient, and simple, and best suited where the number of calves to be vaccinated is small. The requirements are two average-sized gates and a yard, the size of which is not important (see diagram). The method of handling the calves is as follows: A second gate (C) is fixed to the strainer (A) at the opening end of a permanent gate (B) (which must open outward) in the fence enclosing the yard (E). If two or three calves are driven into the angle formed by the closed permanent gate and the temporary gate, the end of the temporary gate may then be brought round to form a crush in which the calves can be conveniently vaccinated by the vaccinating officer working from the position marked D. After a batch has been vaccinated the calves can be let out of the crush by opening the permanent gate, which may be shut again and another batch of calves driven from the yard into the crush.



One assistant is required to bring in the calves and to hold the outward end of the crush, but the time and labour saved by use of this method are appreciable.

—*E. O. PEDERSEN,*

Inspector of Stock, Department of Agriculture, Helensville.

Buying Good Clothes—Good Luck or Good Judgment?

BUYING new clothes is usually a happy experience. There is the pleasure of anticipation, the excitement of selection, and the final satisfaction of wearing the new garment. Unfortunately, however, this satisfaction is sometimes brief—an accidental splash of water, and a good frock may be ruined by a permanent mark; an energetic movement of the arm, and an armhole seam may pull away; a deep breath and buttons or domes may fly off; a gay fabric, apparently similar to one which has survived many washings, may emerge from its first laundering limp and shrunken. Disappointments like these can sometimes be avoided by careful examination before a garment is bought. Many more would be eliminated if comprehensive programmes of informative labelling, standardisation, and education of shop assistants and customers were adopted. In this article Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, offers advice on how the shopper may ensure that she receives full value for the money she spends.

[Photo News Ltd. photo.

The showcard leaves this shopper in no doubt about the content of the fabrics she is examining.

INFORMATIVE labels on fabrics or finished garments provide one way in which manufacturers can make facts available to consumers. A label of this kind should tell clearly.

1. Of what is the fabric made? Is it pure wool, silk, cotton, linen, rayon, or synthetic? If it is a mixture, what fibres are included, and what is the percentage of each? **For example**—Fabric for children's clothes: Wool 40 per cent. cotton 60 per cent. Furnishing fabric: All glass fibres,

2. How is the fabric made? What type of yarn is used? Significant facts about the weaving, knitting, and dyeing processes used in its construction. **For example**—Cotton sheets: 80 lengthwise, 60 crosswise yarns per inch. Silk stockings: Service weight, 42 gauge and 7 thread; sheer weight, 51 gauge and 3 thread. Table linen: Double or single damask.

3. What special characteristics has the fabric? Has it been processed to protect it against fading, shrinking, moths, or water spotting? Is it crease resisting? Is there any special surface or finish, and is this permanent? **For example**—Cotton print: Pre-shrunk, guaranteed, not more than 2 per cent. residual shrinkage.

4. How should the fabric or garment be looked after? Should it be washed or dry cleaned, how hot an iron should be used? **For example**—On a quilted rayon satin and taffeta housecoat: "We recommend that this robe be cleaned by a reliable dry cleaner. The fabric should be steam pressed (not pressed with a flat iron) to keep its fluffy, quilted appearance."

Facts displayed like this can be used as a means of comparison before buying and as a guide afterward.

Standardisation

Standardisation (described in an article in the "Journal" for December, 1948) can be most useful in regulating the sizes and measurements to which made-up garments are cut. This eliminates much trying on of clothes and is helpful in securing correct fittings.

Standard definitions of terms used in describing garments and fabrics are also valuable. A material may be labelled quite accurately "pre-shrunk" and still be likely to shrink up to 5 per cent. in later launderings. If raincoats become soaked in a prolonged downpour they are only "showerproof" and should not be called "waterproof."

Similarly, satisfactory tests and standards can be listed for qualities such as fastness of colour, resistance to wear, and quality of thread and trimmings used in making up garments. If standards such as these were once established, factual labels would be even more valuable.

Education of Sellers and Customers

A system of keeping shop assistants well informed about the articles they are selling would be a worth-while project, and many big stores have adopted staff-training schemes. Customers may ask "Does it wash?" or "Is this sheeting stronger than that one?", but at present they are uncertain if the answers will be accurate, based on the thorough knowledge which comes from years of experience in handling similar goods, or a too-eager affirmative uttered in hopes of satisfying the inquirer and making a quick sale. Especially with new products such as plastics, buyers are anxious to know in what circumstances they will be an improvement on older fabrics and what new methods are required for handling them successfully. There are other sources of information, but it is natural to ask for it as the material is bought.

JUDGMENT IN BUYING CLOTHES . . .

Customers also need to be educated to state their wants precisely and know what questions to ask to help them in filling their requirements. It is recognised now that in an economy where the production and marketing of goods becomes ever more complex, definite education along these lines is needed. School home science courses, for example, now emphasise budgeting of income and give instruction in how to select and buy food, clothing, and household equipment, as well as teaching the technical skills of cooking and sewing. Boys as well as girls can benefit from such classes, and people concerned with adult education report increasing interest in consumer problems.

Points to Observe

The final decision on the choice of a garment will usually be based on "Does it suit me? Do I look well in it?" but thought given to other aspects will not be wasted. Here are some points to observe when shopping for clothes:—

Overcoats and Tailored Garments

Are pleats generous in depth, made from a fold of the main material and not a piece let in, and is material left under the pleats and not cut away? If pleats are stitched down on the outside, are they finished with an arrowhead?

Is any padding firmly fixed and in the right places?

Are buttons, buckles, belt tabs, and any other attachments firmly sewn on?

Are buttonholes finished neatly with binding of equal widths if bound, and with no raw edges or fraying if stitched?

Is the lining of firmly-woven material with a smooth finish? Is there a pleat at the back of the neck to allow for movement? Is the bottom of the lining neatly turned up, hemmed, and left loose from the outer material? The lining should be lifted and the inside of the coat examined for adequate seam allowances and taping and canvas down the front revers.

Particularly in children's coats, is the hem generous in size, and made so that it can be let down without difficulty?

Pockets should be set in or bound. If of the patch type, the corners should be reinforced with extra stitching.

Frocks

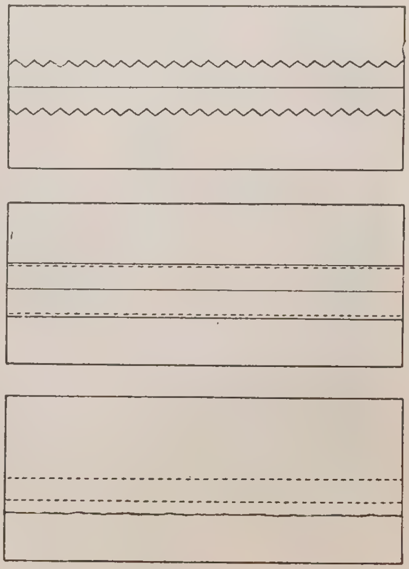
The same workmanship and materials cannot be expected in a cheap cotton beach frock as in a "Sunday-go-to-meeting" silk, but each can be good of its kind.

In washing frocks, particular notice should be taken of buttons and trimmings. If these deteriorate with washing, the whole appearance of the frock may be spoilt long before it is worn out. It is an advantage if shoulder pads are domed in so they can be removed for washing. In a good-quality frock the hem is frequently finished off by stitching and caught up with a few loose running stitches, allowing adjustments to be made for length to suit the wearer when the frock is bought.

Seam finishes are important. With a firm, closely-woven cotton or a woollen material, pressing flat and pinking is a suitable finish, but if the material is inclined to fray, or is a slippery rayon or silk, double stitching, overlocking, or binding should be used. A good ½in. or slightly more turning on skirt seams allows for possible letting out, and may prevent a good frock from having to be discarded.

Underclothing

Underclothing is usually made of cotton, rayon, or wool, all of which are suitable for different purposes. Cotton is hard wearing, durable, and absorbent, and is good for children's garments. Rayon gives something of the luxurious sheen and feel of real silk, it washes and dries easily, and is preferred by many women. Wool or a wool mixture provides the best protection against cold, or against chilling if the wearer is likely to become overheated through strenuous work or violent exercise.



Three acceptable seam finishes: Upper—A plain seam with pinked edges. Middle—A plain seam, pressed flat, with the edges turned down and stitched. Lower—A plain seam, stitched twice.

If the garment is rayon, look for a label stating the kind of rayon and the correct procedure for laundering; a cool iron must always be used for acetate rayon. Wool mixtures should show the percentage of wool and whether a shrink-resistant treatment has been applied. Seams in knitted fabrics should be overlocked to prevent laddering; in woven garments double seams, either french or flat, are best. If lace trimming is used, it should be firmly sewn on, and not flimsy. Shoulder straps should always be fastened to the garment itself, not to the lace. Adjustable shoulder straps are an advantage on slips and brassieres. Bias-cut slips should be examined for stretching or unevenness of hemlines. Wide hems or bands are the best finishes for the lower edges of garments.

Correct fit is most important in underclothes in order that outer garments in turn will look their best, so sizes and measurements should be checked unless a brand which has been satisfactory in the past is being bought.

Stockings

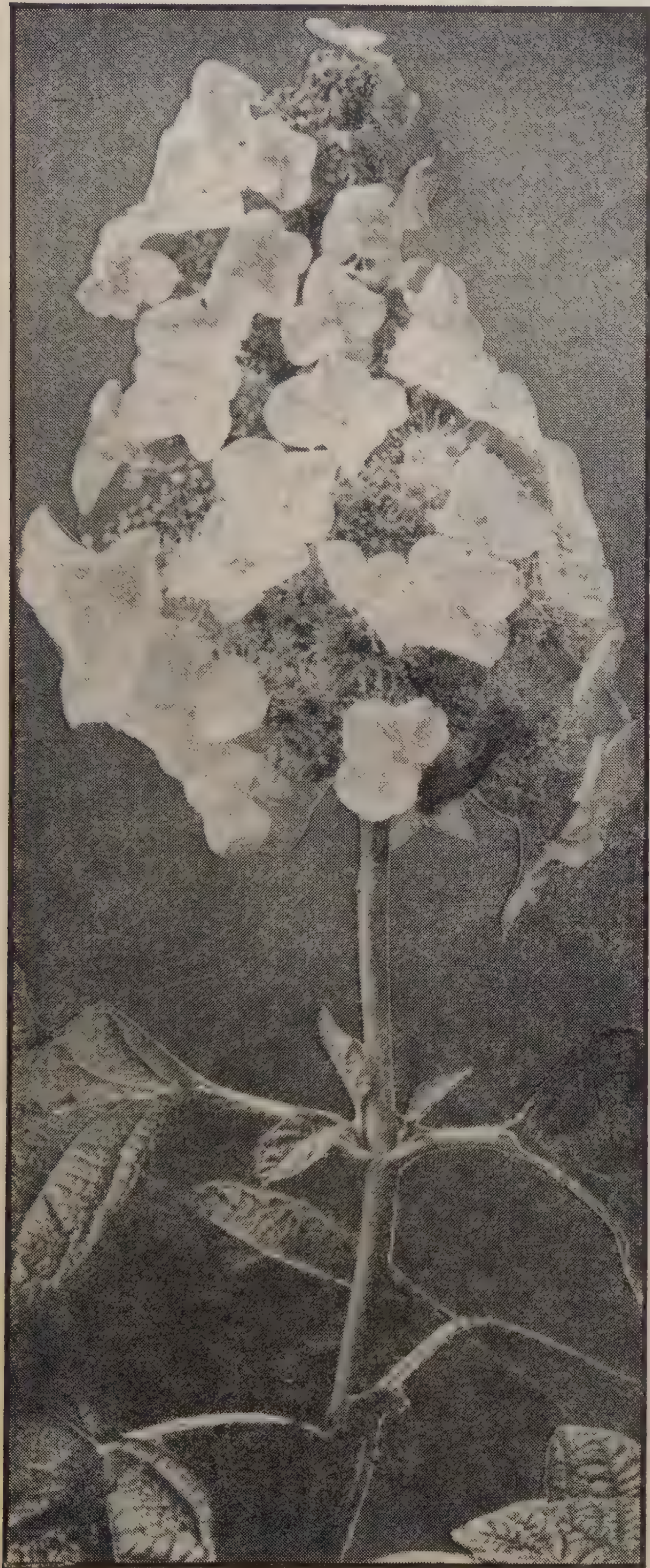
Stockings are much more plentiful now, and buyers may take their choice of many types instead of having to accept anything that is available at the time. The production of nylons does not yet seem to have reached the level of satisfying all demands, but if the desired nylons are not available, the shopper will find sheer or service-weight silk or rayon. Cotton lisle and wool, though not so attractive in appearance, are valuable for warmth in winter and for hard wear—for example, around the house. Nylons are popular because of their smooth, sheer appearance, their resistance to snagging, and rapid drying when washed. However, if snags do break, nylon will run more rapidly than silk. Silk, even when sheer, is rather more opaque than nylon, and some wearers prefer this. For everyday wear, sheer stockings are a rather expensive luxury; a heavier weight will last much longer. Where appearance is not important, money can be saved by buying unfashioned or semi-fashioned instead of full-fashioned stockings.

Double tops and reinforced feet will lengthen the life of stockings, and a ladder-stop row at the junction of leg and top is another desirable feature. When the correct size has been found it should always be bought. Toes and shoes cause damage if stocking feet do not fit. Wrinkles mar the appearance of a stocking that is too long, and too much stretching causes holes in one that is too short. It may be possible to find the most satisfaction in brands which supply two or three leg lengths to one foot size. The elasticity of silk and the heat-moulding treatment of nylon make these stockings fit better than rayon, which stretches when worn. As rayon fibres lose strength when wet, these stockings must be washed carefully, without twisting or wringing, and not dried on an outdoor line on windy days. Nylons should not be dried in front of a fire or heater.

Stockings should be examined for the following defects before being bought: Rings caused by irregularity in dyeing or knitting, a line round the ankle where stitches are picked up for the foot and changed to another machine in the manufacturing process, and lengthwise streaks caused by poor dyes. It is a good practice to buy 2 identical pairs of stockings at a time and to wear them the same amount; then, if unmendable runs develop, 2 good ones may still survive to make a pair.

Buying is a science to be studied and learnt with care. The average housewife probably feels that already she has to spend too much time in shops looking for the goods to satisfy her family's requirements. However, a little more time might result in greater satisfaction, and more questions might lead to the provision of more helpful information by manufacturers and shop assistants, and eventually to a greater supply of the goods needed.

All-the-year-round Flower Gardens Require All-the-year-round Attention



MOST people in New Zealand live in areas where mixed borders can be kept cheerful with many different kinds of flowers throughout the year, but having flowers all the year round—the result of an equable climate and abundance of winter sunshine—also necessitates some work being done in the borders at all times of the year. There can be no "slack" season in year-round gardens. Routine work for March is detailed in this article by J. P. Hudson, formerly of the Horticulture Division, Department of Agriculture, Wellington.

BULB planting is the big task for March to ensure a really-good spring display. Most bulbs should be planted with their tops about twice the diameter of the bulb below the surface, but tulips may be deeper where they can be left in the bed for several years. Daffodils, tulips, and hyacinths should be planted 6 to 10in. apart to make a bold display; smaller bulbs should be set out 3 to 6in. apart. Bulbs cannot be expected to do well on poorly-drained soil, as their roots will die if the soil becomes waterlogged. A site likely to lie very wet in winter should not be used for planting bulbs unless it can be drained.

Chrysanthemums are the queen of autumn flowers, giving a show of colour after most other plants are finished. The type of display which chrysanthemums make depends to a large extent on whether the plants are disbudded. Disbudding consists of removing unwanted flower buds when they are about the size of peas by pushing them gently sideways until they fall off. Usually the central bud is left and the smaller side buds removed (though the gardener paradoxically refers to "taking" the bud which is left on the stem—that is, the bloom is "taken" on the central bud and the side buds removed). The more buds are removed, the larger the remaining flowers will grow. For exhibition work a single bud is left on the end of each stem, each developing into a large flower, but such drastic disbudding is not necessary or desirable where the plants are growing in borders for garden display. On the other hand, on most varieties it is a mistake to leave all the buds, as this results in a mass of small, overcrowded flowers. The best treatment for most border chrysanthemums for the finest display of flowers is to disbud each stem to 2 or 3 flowers at most. All side shoots should also be removed, as otherwise they may bear small flowers and detract from the balance and beauty of the plants. Correctly-disbudded stems will be less likely to bend over under the weight of the flower heads in wet weather. In cold districts chrysanthemums growing in pots should be taken indoors before there is serious risk of a severe frost, which might ruin the developing buds. Even in mild districts it pays to put the pots in a more sheltered position where strong winds will not damage the petals as the flowers open. In cold places where heavy autumn frosts are likely, chrysanthemum plants can be wrenched carefully by pushing a spade into the ground all round them 4 to 5in. from each plant, then lifted about a week later and planted in a glasshouse or in boxes of soil stood in a sunny

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Left: The oak-leaved hydrangea *(Hydrangea quercifolia)* is a handsome deciduous shrub growing up to 8ft. high. It bears cream-coloured flowers in summer, and its leaves make a good display of colour in autumn. [*Douglas Elliott photo.*

WORK IN THE FLOWER GARDEN

This spring display of flowers in a Wellington garden consists mainly of daffodils, narcissi, pot marigolds (calendulas), marguerites, and hybrid wallflowers. March is the best time for planting narcissus bulbs and plants of the other species to ensure a good display of colour in spring.

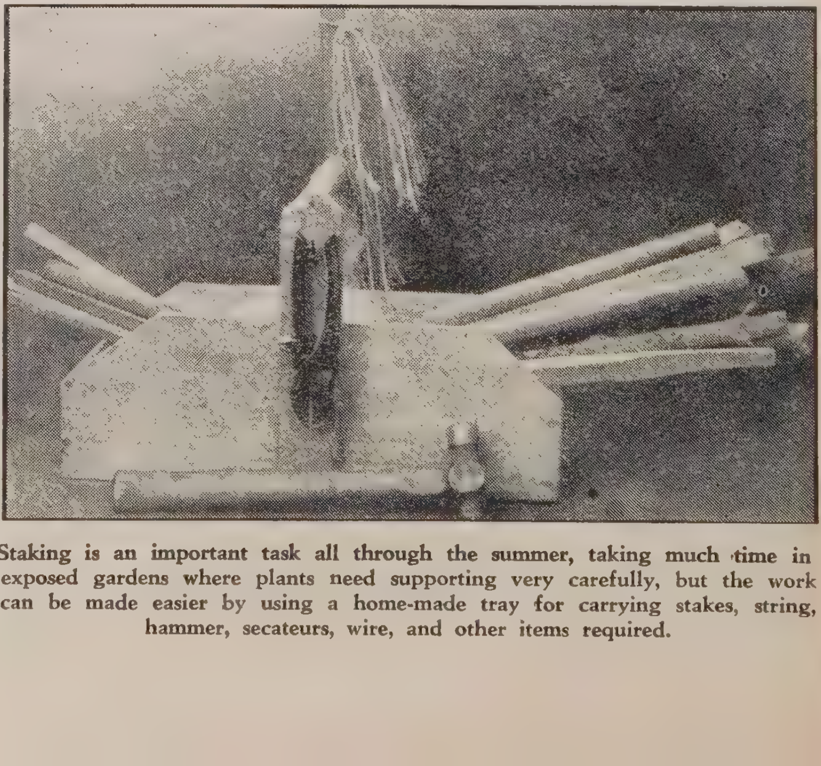
porch. A chrysanthemum plant in full flower growing in a pot or box is a worth-while ornament in any room, but plants should not be taken indoors until the flowers are fully open. Buds which open inside a house are pale and anaemic looking, as the petals do not develop their full rich colours indoors.

Dead heads must be removed regularly from all flowering plants in the borders to prolong the display as late into the autumn as possible. Cutting dead flower heads is not the dull, uninteresting job so many gardeners seem to think, but can become really fascinating to anyone who studies the growth systems of different flowering plants. These were described, with diagrams, in the December, 1947, issue of the "Journal." A most successful home gardener, whose flower borders are brighter than his neighbours' at all times of the year, recently attributed much of his success to never missing the weekly "dead heading." However busy he was, and whatever other work had to be neglected, he made an invariable rule of going through the borders from end to end every weekend, cutting off dead flower heads with one hand and dropping them into a bucket held in the other. The heads were always put on the compost heap, where they made an important addition to the organic matter rotting down, and it was common, from his ¼-acre section, for this gardener to take 8 or 9 bucketfuls of dead flower heads a week in the height of the season.

Dwarf conifers are used to very good effect in American home gardens—in fact, the study of their use is probably the most important contribution to the art of domestic gardening yet made by horticulturists in the United States. So far, New Zealand gardeners have not appreciated the full value of dwarf conifers, which can be used for many purposes, looking neat and tidy yet needing very little maintenance if the correct species are chosen. Though usually thought of as evergreen, the dwarf conifers have foliage varying in colour from bright yellow through many shades of green to glaucous blue, and different species have characteristic shapes, some being of the tall columnar habit, others globular, while some even form flat, prostrate mats of foliage suitable for clothing a pavement or cascading over the edge of a retaining wall or rockery. Dwarf conifers are particularly useful for planting near the house, breaking up hard lines and adding point to the architectural features of the building. As the dwarf conifers grow slowly—which is, of course, their main virtue for home garden use—the purchase of well-grown specimens for planting is worth while. These are usually expensive compared with quicker-growing species, but the plants must be grown and tended by nurserymen for a number of years before they are of saleable size.

Gladiolus corms lifted earlier can be cleaned up, when the outer skins are crisp and the foliage is dead, by cutting off each stem about ½in. above the new corm, and breaking off the shrivelled old corm. The corms and cormlets should then be put away for the winter in a cool, dry place. It is best to store corms with the outer skins still on and not to husk them (remove the skins) until just before planting time. The lifting of gladioli as soon as the leaves show a marked change in colour (usually about 6 weeks after the flowers have faded) should continue. On gladioli which have been grown for seed the pods should be left on the stems until they are nearly ripe, and then picked at the first signs of splitting to avoid loss of seed. Keep the pods on a sunny windowsill for a few days, then shake the seeds out of the pods, sow them at once ¼in. deep in boxes of John Innes seed-sowing compost, and water them in.

Hydrangeas are often spoilt by incorrect pruning, especially when they are cut back hard in winter, resulting in the loss of all the flower buds which should have flowered early in the following summer. By intelligent pruning hydrangea bushes can be kept neat, shapely, and well clothed in summer and autumn, with



Staking is an important task all through the summer, taking much time in exposed gardens where plants need supporting very carefully, but the work can be made easier by using a home-made tray for carrying stakes, string, hammer, secateurs, wire, and other items required.

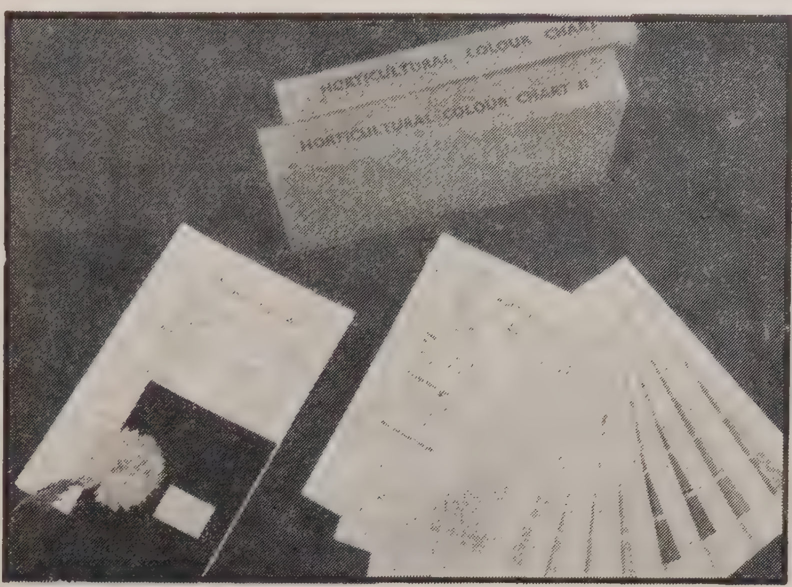


Chart for Identification of Flower Colours

THE naming of the colours of flowers has been the subject of much confusion. One nurseryman may describe a flower as "magenta," another will catalogue it as "purple," and a third as "violet." A standard for the naming of colours has now been set by the British Royal Horticultural Society, which has published the Horticultural Colour Chart in 2 volumes, price about £3 10s. in New Zealand.

For the purpose of this chart colours have been divided into 64 "full hues," covering the whole range of the colour spectrum. The full hues are subdivided into "tints" (which are lighter colours than full hues), "shades" (darker than full hues), and "greyed hues," covering the whole range of colours likely to be needed by horticulturists. The colours are printed on 200 separate sheets, with 4 blocks of colour on each sheet, and by the use of the chart the colours of a flower or leaf can be matched exactly and given a name or number that will convey the precise colour to anyone possessing the chart.

Home gardeners may not need the Horticultural Colour Chart, but it will be invaluable to nurserymen, and especially breeders of new varieties of flowers, enabling them to give accurate descriptions of their introductions in their catalogues. That will be specially valuable to buyers overseas, who do not have an opportunity of seeing the new introductions at flower shows in New Zealand.

flowers borne on long, straight stems suitable for cutting if desired. The technique of pruning (described and illustrated in the January, 1947, issue) entails going over each bush carefully in late summer, when the main show of flowers is over. First cut out any weak shoots, and then remove all the shoots which have flowered, provided plenty of strong new shoots are growing up from the centre of the bush. If there are relatively-few shoots, retain some or all of those which have flowered, but shorten each one back by removing the flower head and 3 or 4in. of the woody growth. Unless the bush is very crowded, never cut out or shorten the new shoots, as these bear the following year's flower buds and any pruning inevitably reduces the number of flowers borne. In districts liable to heavy winter frosts, hydrangeas should not be pruned until spring, leaving the old stems and even the faded flower trusses to give some protection from frost to the new shoots and buds.

Lawns are best sown in March, late in the month in the north and earlier in colder districts, though the sowing may have to be delayed if the season has been hot and the soil is still quite dry. The area should be prepared finally, after the preliminary work done earlier, by raking the surface perfectly level on a day when the soil breaks down into a fine tilth, but there should be not more than about ½in. of loose soil overlying the well-consolidated lower layers. It has been recommended that the area be dressed before it is sown with a mixture of ½oz. per square yard of sulphate of ammonia and ½oz. of superphosphate, with ¼oz. of sulphate of potash added if the soil is sandy or peaty. The best mixture of seeds for sowing home lawns is 2 parts of New Zealand chewings fescue and 1 part of Government Certified browntop, sown evenly at the rate of 1oz. per square yard. To ensure even sowing, it is best to divide the seed into at least 2 lots and sow each of them separately, traversing the lawn in 2 different directions. Finally rake over the surface lightly. Seed should be sown only if the ground can be walked over without soil sticking to the boots. If the soil is sticky, it is wise to delay sowing until it is in better condition; bare places in lawns should also be worked over and resown in March. The quarterly dressing of fertiliser should be applied to established lawns, using 1oz. per square yard of a mixture of 3 parts of sulphate of ammonia, 2 parts of superphosphate (1 part on well-established lawns), and 1 part of sulphate of iron. March is about the latest month for using hormone weedkillers on lawns, as they are not nearly so effective in cool weather. Go over lawns treated with hormones last month and remove by hand any weeds which were not destroyed. Rosette weeds, such as dandelions, plantain, and cats ear, should be dug out with their roots. If only the crown is snapped off, leaving the roots in the ground, these will quickly produce new buds and grow again.

Loam for use in mixing seed-sowing and potting composts in spring should be dug and stacked to rot for 6 months before being used. The ideal soil to use for this purpose is a fertile medium loam, neither too clayey nor too sandy, chosen from a paddock where grass has been growing well. A soil that has not supported even a crop of grass is not likely to be fertile enough to produce good pot plants. Very poor loam can be improved by mixing with it up to 1/6 of its bulk of animal manure as the stack is built up, but the use of a fertile loam is preferable to having to fortify a poor one in this way.

Pot plants need a constant supply of moisture for proper growth, but are more often killed or injured by too much watering than by not being watered enough. The art of growing good pot plants depends very largely on the correct use of water, a question that is worth a little study. Soil physicists speak of two important conditions of soil moisture—"field capacity" and "wilting point." Field capacity is the greatest amount of water a soil can hold without being waterlogged. If a plant pot of soil is immersed in water for a few minutes and then taken out and allowed to stand for a time, all the surplus water will drain out through the drainage hole, but water ceases to run out after a time, though the soil remains very damp. At this stage the soil contains as much water as it can hold—the field capacity of water. If the pot is then allowed to dry out gradually without further watering, there comes a point at which the plant living in the pot will droop and wilt, because its roots can no longer draw any water from the soil. The soil moisture is then said to have been reduced to the wilting point. Analysis at this stage would show that the soil still contains some moisture, but it is locked tightly in the soil and cannot be used by plants, so is valueless.

The soil moisture in a plant pot with a drainage hole can exceed field capacity only if the drainage hole becomes choked up, and there should be little fear of that happening if the pot is properly filled. However, if the drainage is impeded and the soil waterlogged, most plants will become unhealthy and may even die, as the roots quickly perish under waterlogged conditions. If water lies for more than a moment or two on top of the soil after watering, something is gravely

[*Photo News Ltd. photo.*

Borders and lawns need constant attention, but a well-cared-for-lawn, free from weeds and neatly trimmed, is an asset to any home and repays the work needed to keep it in good condition. One of the most important items in lawn maintenance is the quarterly dressing of fertilisers described in this article.

wrong and the plant should be re-potted or the drainage hole cleared. Even if the drainage is perfect, there is no point in giving plants too much water, as it will only run to waste through the hole in the bottom of the pot, perhaps overflowing the saucer and wetting the windowsill or furniture on which the pot is standing. The aim of watering should be not to let the soil become wetter than field capacity or as dry as the wilting point. Science seems to show that plants do equally well if the moisture content lies anywhere between these two extremes—that is, there is no condition midway between them at which plants do better than at any other.

The best way to judge whether a plant requires water is to tap the side of the pot with a bone knife handle. If it rings, because the ball of soil has contracted away from the side of the pot, apply water until the pot is full to the brim, filling the ½in. space which should have been left for this purpose between the soil and the rim. That amount of water should thoroughly wet all the soil, and any surplus will run out through the drainage hole. A dull, thudding note when the pot is tapped indicates that the soil is in close contact with the wall of the pot and is still damp; therefore no water is needed.

If watering consists only of dribbling a few drops on to the surface daily, the topsoil soon becomes sodden and compacted, giving the illusion of being wet enough, while the lower layers of soil may dry out altogether. If a pot has accidentally been allowed to become very dry and the soil has shrunk far away from the side of the pot, most of the water will run down the crack and wetting the ball of soil thoroughly will not be easy. The best plan is to immerse the pot in a bucket of water for 5 to 10 minutes, until all the soil has been wetted, and then stand the pot to drain before putting it back in the house.

"Pot up," "pot on," "pot-bound," "re-pot" and "pot back" are terms, often used in gardening literature, each with a definite meaning, and which may confuse home gardeners. To **"pot up"** is to put a plant into a pot for the first time—for example, a seedling out of a box, or bulbs which have been in store. **"Potting on"** is moving a plant from one plant pot into a larger one, usually at least 2in. larger in diameter, as there is no point in potting on a plant into a pot only a little larger than the one in which it has been growing. Plants are potted on when they have used up the plant foods in the soil in their pots and can make no further progress unless given new soil and more room. Plants which are beginning to be starved and have filled their soil with roots are said to be **"pot-bound."** Pot-bound plants can usually be kept growing healthily a little longer without being re-potted if they are fed with suitable plant foods in the form of liquid manure or topdressing well watered in. The term **"re-pot"** is often applied loosely to potting on, but, strictly, re-potting is taking a plant from its pot, removing as much soil as possible without injuring the roots, and then putting the plant into another pot of the same size, using fresh potting compost. Palms and many pot plants grown indoors are re-potted each season when they have reached the largest size of pot in which it is convenient to have them growing in the house. **"Potting back"** is not a normal process, nor is the term in general use, but it can be applied to the removal of plants such as begonias or fuchsias from their pots at the end of their dormant seasons, when they have been more or less dried off for a few months, and potting them into smaller pots to start into growth again.

Roses make great demands on food and moisture in the soil, and grow to perfection only where their roots can draw on an adequate supply of these two essentials. Relatively low-growing plants like violas and pansies are commonly set out between the bushes to flower in spring before the roses come into bloom, but except in very deep, fertile soil it is not a good plan

[*Jack Welsh and Sons photo.*

Seedlings in boxes will grow uniformly only if the soil is firmed evenly, especially at the edges and corners, and correctly watered. Boxes dry out first round the edges, where the outside rows of plants receive a check, from which they never recover fully. Plants that tail off round the edge of a box of seedlings give irrefutable proof that watering has been neglected at some stage in their growth.

[Douglas Elliott photo.

***Solanum wendlandii* is a very useful climber, not hardy to hard frosts but suitable for milder districts and sheltered places. It has large blue-mauve flowers, borne in profusion in late summer.**

to have other plants growing between roses in summer, when the bushes need all the moisture available in the soil. Inter-planting of other flowers is a common cause of roses doing badly, especially in gardens with relatively-poor or shallow soil. Pull or cut out suckers arising from the bases of bush roses or from below ground level. The suckers, which arise from the stock on to which the rose variety was budded, often grow more strongly than the rose itself, and will soon spoil the bush if left to grow.

Silt loam soils, common on the alluvial plains of New Zealand's eastern seaboard from East Cape almost down to Bluff, have certain properties which should be understood by those whose gardens are on them. From a horticultural point of view the most important characteristic of these soils is that the particles do not readily form into "crumbs." When soil is in good working condition (in a state of "tilth"), the minute particles stick together into small lumps ("crumbs"), between which air can pass readily into the lower layers of soil and between which growing roots can pass easily. A fair proportion of clay in the soil helps greatly in cementing the particles together into crumbs, and a proportion of coarse sand will itself keep the texture open and ensure that air can pass readily into and out of the soil. However, the silt soils in this populous stretch of New Zealand have neither enough clay to ensure crumb structure nor sand to keep the soil naturally open. In these soils a good tilth depends almost entirely on the soil being regularly provided with humus, as actively-rotting organic material is very effective in forming crumbs. Once the particles have been cemented together, the crumbs are surprisingly stable and do not readily break up, even in wet weather (that is, they are "water stable"), though they are easily broken if trodden on or knocked about with a cultivator when wet. Once a silt soil has lost its crumb structure, the surface runs together as soon as rain falls, all the lumps dissolving at once when wetted. The surface layer then cakes into a hard crust when it dries, preventing air from getting down to the plant roots. Moreover, if the hard layer extends to any depth (and in dry summers it may be 8in. thick or more on a badly-managed silt soil), plant roots may find it impossible to grow through the soil at all.

Regular use of well-rotted compost, applied as a thin layer over the surface of the soil, is the finest way of keeping silt soils in good condition and preserving that nutty texture, not unduly affected by rain, that a gardener feels is right for plant growth.

Sweet peas grow best in a site specially prepared for them, as described in the December, 1947, issue of the "Journal." A trench 2 to 3ft. wide should be taken out, the topsoil being dug out to a depth of 10in. (a "spit" of soil), and put to one side of the trench. Next dig out the second 10in. of soil, and put it to the other side of the trench. Then put a layer of compost and household scraps in the bottom of the trench, dig or fork it in, tread it firm, and replace the second spit of soil, again mixing in organic matter. The final spit of soil should be scattered with complete fertiliser at the rate of 2oz. per square yard, and then worked back into the trench, after which the whole area should be dressed with 4oz. of garden lime (carbonate) per square yard. Those preparations will lay the foundation for a first-rate row of sweet peas, provided the ground is well drained. If the subsoil is impervious clay, a deep trench would serve only as a sump for the collection of surplus water from the soil on either side. On clay soils it is better to prepare a wider strip, but not to such a depth, and, if possible, provide some form of outlet for drainage water from the lower levels of soil in the bed.

Tulips of the Darwin varieties should be potted up in March to give a good spring display. The pots should be stood in the coolest available place for 6 to 8 weeks after being potted to encourage the plants to develop a large root system before the leaves start to grow. A cool, dark cellar or a shady place under dense, evergreen trees is ideal. The pots should be watered occasionally to prevent the soil from drying out, though the plants use little water at this stage. If stood in the open, the pots may be covered with a thick layer of soil or old ashes to keep them cool and prevent drying out.

Weeds are easy to keep down through the dry weather of summer, when any weed cut off will soon dry out and die. However, a new crop of weeds appears very shortly after the first autumn rains have thoroughly wetted the surface layers of soil, the warm, moist soil being an ideal medium for the germination of weed seeds which have ben lying dormant in the dry soil through summer. To keep the borders weed free, it is important to hoe through them as soon as possible after the first autumn rain, cutting off all the young weed

[*News-photo Service photo.*

Eleagnus makes a useful hedge that stays dense but requires very frequent clipping because of its rapid growth. It soon looks untidy and overgrown if trimming is neglected.

seedlings, which are killed easily at this stage. At the same time, keep a sharp lookout for any young self-sown seedlings of border plants that may be worth lifting and boxing up to provide useful plants for setting out in the autumn and filling gaps in the borders. Antirrhinum, pot marigold, cineraria, and many other types of seedlings can usually be found growing in borders containing these plants. Self-sown seedlings will not necessarily produce flowers of the same colours as their parents, and plants grown from these self-sown seedlings should be rigorously rogued when they come into flower, any with poor form or washy colours being pulled out.

"Wrenching" is the cutting of the long roots of shrubs which are to be moved later in the winter or next spring. If a shrub, especially an evergreen, is dug up without this preliminary, the roots suffer severe mutilation, and new roots will not form for some time. During this interval the leaves continue to require a supply of sap, which the roots may not be able to provide and, in consequence, the leaves may flag and the plant receives a severe check. On the other hand, if the main roots are severed a short distance from the plant by driving a sharp spade slanting into the ground about 1/3 of the plant's height away from it, and the plant is then left for a month or two, a number of new young roots will arise from near the butt. These nourish the plant when it is moved and so avoid any undue check. March is the best month for wrenching evergreen shrubs. It is not so necessary to wrench deciduous shrubs, which should be moved during the dormant season when they bear no leaves. Very large old shrubs should be wrenched in two stages, a trench being dug half round the plant to allow half the roots to be cut in March and the remainder being cut a month later. Wrenching is best done when the soil is still moist after recent rain, and plants recover most quickly from the shock if a few dull days follow wrenching. However, if recently-wrenched plants flag in a hot sun, they should be watered if the soil is dry, or perhaps given some relief by the rigging up of a temporary shading. Even a few sheets of newspaper thrown over a row of plants will do much toward preventing them from flagging in the sun.

Plants to Propagate this Month to Ensure a Garden Full of Flowers

Budding can continue as long as the bark lifts readily. Loosen the ties on buds inserted earlier.

Cuttings which can still be rooted include those of violas, pansies, geraniums, antirrhinums, many shrubs (from side shoots taken with a heel of old wood), hydrangeas (from the leafy tips of new shoots), pentstemons, verbenas, and *Crassula coccinea* (a very showy perennial bearing brilliant red flowers for a few weeks in the new year). The rooting hormones, which increase the range of plants rooted easily at home, are most effective when applied to leafy shoots. They are much less effective on winter cuttings of deciduous shrubs. Hormones are chemicals of which only the minutest doses are required, and they should always be used strictly according to the maker's directions.

Lift, divide, and replant clumps of the mourning iris (*Iris susiana*), and of early-flowering herbaceous plants such as doronicums and polyanthus if they were not divided in early summer after flowering. Where polyanthus were lined out in a spare part of the garden for the summer, lift the crowns now and plant them in the flower border for spring display.

Plant out rooted cuttings from the frame, polyanthus and primula seedlings raised in boxes, rooted layers of border carnations, violets struck from runners planted in September, any wallflowers still not planted (pinching out the tip from each shoot to make it branch), and Iceland poppy plants. The ground should be given a dressing of 4oz. of garden lime (carbonate) before Iceland popies are planted out.

Pot on cyclamen started into growth earlier in the new year, and **pot up** a few rooted cuttings of balsams, fuchsias, and geraniums, to make good house plants next year. **Prick out** any earlier-sown seedlings now large enough to handle.

Sow antirrhinums in boxes to provide early plants which will be ready to be set out in the border before winter to flower in spring. Sow sweet peas in boxes, putting the seeds 1½in. apart, and a few larkspurs, which flower best from autumn sowings. The best way to keep birds off seeds sown outdoors is to string 1 or 2 threads of black cotton tightly about 3in. above the ground. Birds cannot see the thread easily and are frightened when their wings touch it. Cotton used in this way is often more effective than elaborate entanglements provided it remains stretched tightly.

Sow, Plant, or Propagate Something Every Month

Other Tasks for the Month

Thin out recently-sown **annuals** as they become large enough to handle. Pull out annuals which have finished flowering.

Cut back **antirrhinums, marguerites, and hybrid wallflowers** to encourage young growths for winter flowering in milder districts, and pull out overgrown **pot marigolds** and other annuals to make room for planting those which will flower in early spring.

Start **cyclamen corms** into growth if this has not already been done.

Ripen off **gloxinias** and **achimenes** by gradually drying off the plants.

Trim **hedges** for the last time this season if they require it.

Plant **lilies** as soon as bulbs can be had from seedsmen or nurserymen. Lilies recover better from early planting.

Continue a relentless war on **oxalis,** cutting it off every time a leaf can be seen.

Complete the pruning and tying of **rambler roses.**

ROYAL VISITORS TO NEW ZEALAND

The Duke of Edinburgh

APRIL 12, 1869, was indeed an auspicious date in the annals of New Zealand history, for it was the first time a "Prince of the Blood" had set foot on the faraway shores of Aotearoa. Such an event was all the more significant, too, in that His Royal Highness the Duke of Edinburgh, the second son of Queen Victoria, with true British courage and determination, had made this trip specially to fulfil his promise to visit the youngest of Her Majesty's possessions in these seas, his tour of the Antipodes the previous year having been cut short because of a serious arm wound he received in a dastardly attempt to assassinate him just as he was leaving Australia.

ACTUALLY H.M.S. Galatea entered Wellington Harbour on the morning of April 11, at an hour when most people were in church. Prince Alfred likewise believed in observing the Sabbath and deferred his landing till the next day, the Governor, Sir George Bowen, meanwhile having gone on board on the Sunday afternoon to welcome him. The long white clouds lay low over the hills on the Monday morning, but gradually they lifted and the sky showed slashes of blue, and though a stiff breeze sent swirls of dust among the vast concourse of spectators, it set all the flags and banners fluttering bravely. The local militia were drawn up in imposing array, the Greytown Cavalry augmenting the excellently-mounted Hutt forces, and there was also an impressive muster of Veterans. As the boat bearing His Royal Highness approached the Queen's Wharf the Maoris could contain their excitement no longer; they danced and gesticulated, throwing their weapons high into the air as they burst into a chant of greeting: "Welcome hither, illustrious guest." Their thunderous shouts of "Haeremai! Haeremai!" mingling with the cheers of the pakeha populace plainly puzzled the boat's crew, who were totally unacquainted with the native language and customs.

After the Superintendents of Wellington and Marlborough had both presented an address of welcome the Royal procession started, passing the Bank of New Zealand and proceeding along the Beach (now Lambton Quay) past Mr. Owen's drapery establishment whose extensive show windows "instead of being filled with temptation to extravagance in the form of bareges, silks, and muslins, were filled with infinitely more dangerous temptation by the presence of a bevy of pretty girls," and thence to Government House. A group of gaily-dressed ladies and gentlemen in orthodox black had marshalled 1500 little children in the domain and at a given signal they sang the National Anthem with decided "spirit and effect." It is pleasing to note that the youthful choir was duly rewarded by a treat in the shape of tarts and buns. The pupils of the Johnsonville School were conveyed to the celebrations in a huge wood wain bedecked with banners and evergreens. The wagon was drawn by seven horses each bearing a diminutive postilion patriotically dressed in a red sash, white shirt and pugaree, and blue trousers.

THERE have been five Royal Visits spaced over the brief history of this country's settlement by Europeans. The Dominion's ties with the Homeland have never been stronger than they are today, and there can be no doubt that the gracious presence of members of the Royal Family in this country from time to time has done much to foster the retention of this sense of close kinship.

Disappointment at the postponement of the visit of the present King and Queen and Princess Margaret was as deep as the sympathy was universal for the King in his illness. Until the realisation of that postponed visit the story of the sixth Royal Visit to this country must remain unwritten, but in the meantime there will be presented in the "Journal" a series of five articles by Enid B. V. Phillips on previous tours of New Zealand by members of the Royal Family. Running through them is an unbroken thread of loyalty to the Crown; the sidelights which embellish the narrative are always interesting and sometimes amusing. From the material the writer has gleaned from civic records and Press reports at the times of the visits a fascinating picture of the social development of the colony may be drawn.

H.R.H. Alfred Ernest Albert, Duke of Edinburgh, K.G., K.T.

In the afternoon the Duke held a levee which was attended by many distinguished colonists and at night the whole town turned out to see the illuminations, bonfires on the encircling hills adding their alluring lights and shadows to the scene. Tiers of candles provided dazzling displays in some of the houses along the waterfront and householders as well as shopkeepers had set transparencies in their windows. Needless to add, His Royal Highness figured prominently in these highly-coloured pictures painted on semi-transparent materials and so placed as to be seen with the light shining through them, and there was a multiplicity of mottoes, monograms, and figures from mythology.

The following day the Duke witnessed a war dance executed by between two and three hundred Maoris in a paddock adjoining the Thorndon Barracks. He then entered his barouche and drove to the Hutt, where the inhabitants had erected a triumphal arch of nikau and fern. He was met at Petone by the Hutt Cavalry, who escorted him through the Taita district to the hamlet of Upper Hutt some miles beyond. The local paper lamented that the Duke's driving was too fast for the grass-fed horses of his escort, the cavalry having difficulty in keeping up with him. The Upper Hutt settlers had taken great pains with their decorations and had thoughtfully provided seats for the women and children. They had intended having some fireworks, but unluckily these miscarried, and the fireworks which did eventuate were of a completely different nature, the stables at the Criterion, the hotel where the Duke had stopped for a cup of coffee, being burnt to the ground. Fortunately the contretemps occurred after the Duke had returned to town, where he was due to attend the Citizen's Ball.

The Citizens' Ball

This was held in the Government Offices at Thorndon, the august precincts of the Legislative Council and the House of Representatives being appropriated to dancing and adorned with fluted panels of white and gold drapery, garlands of flowers, banneroles, etc. The Treasury was turned into a ladies' dressing-room and the long passage linking the two halls had undergone an even more romantic transformation, being lit by Chinese lanterns and lined with couches. Shortly before 9 o'clock the carriages began to arrive and an interested crowd assembled to watch the occupants alight. The galleries of both halls were filled with elegantly-attired ladies whose animated appearance as they scanned the throngs below and noted the costume of each new arrival formed an agreeable contrast to the somewhat motley audience which gathered when the occasion was one of political conflict.

His Royal Highness, resplendent in the full naval uniform of a Post Captain, and wearing the Ribbon and Star of the Garter, arrived punctually to the strains of the National Anthem, and promptly offered his hand to the Hon. Mrs. Stafford, the Premier's wife, who was gowned in blue satin, the "boddice" being trimmed with tulle, and as many couples as there was room for having taken their places, the ball was opened with a quadrille. Later he partnered Mrs. Justice Johnston in a set of lancers. (Mrs. Johnston wore a black velvet dress and a white ostrich feather surmounted the scarlet velvet riband in her hair. The Hon. Mrs. Domett, wife of the poet who was one of the founders of General Assembly Library and was now Secretary of Crown Lands, was another who favoured black velvet. The younger belles preferred pastel colours trimmed with tarlatan or tulle furbelows, and pink satin trains were also popular. The vogue for headdresses was at its height, one of the most striking being of scarlet geraniums worn with an ivory silk gown. Moss rosebuds looked well with green moire, as did greeny, orchid-like blooms with a similar shade of satin and blonde lace, while a combination of clematis and lilies-of-the-valley formed an exquisite finish to a frock of white moire. A stylish black ball gown was complemented by a coronet of crimson roses, a matching spray being tucked into the Brussells lace over-tunic.)

Just before supper the Duke's own piper, handsome in Highland costume, struck up a Scotch reel which was danced with all the gestures and joyous abandon characteristic of this peculiarly national dance. After such strenuous activity the supper adjournment must have been exceedingly welcome. The Duke's health was proposed by His Honour the Superintendent of the Province, Dr. Featherstone, and the well-known chief Wi Tako spoke on behalf of his race. A large number of leading chiefs and their wives were among the guests and Wi Tako's wife had brought her wee baby with her. Though only a few months old, the infant behaved admirably and did not disturb proceedings in the least. The Duke danced one more set of quadrilles, leaving the ball at ¼ to 2 o'clock, but his suite remained until a much later hour. Indeed, the general feeling seemed to be:

On with the Dance, let joy be unconfined;
No sleep till morn, when youth and pleasure meet
To chase the glowing hours with flying feet,

Queen's Wharf, where the Duke of Edinburgh landed from the Galatea, as it appeared about the time of his visit to Wellington.

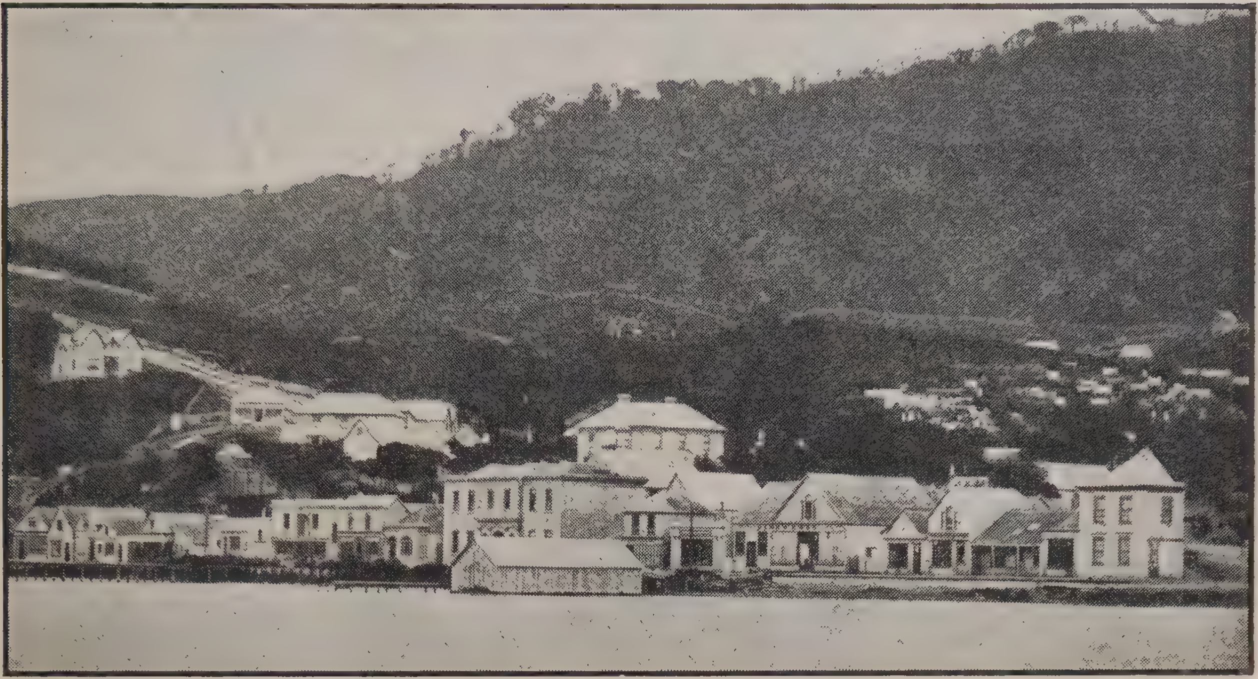
and the daylight gun was fired from the Commodore's ship before the last of the revellers retired.

The Duke, with his customary vigour, was up betimes to plant a totara and several other trees in the grounds at Government House. These were protected by ornamental circular wire guards specially manufactured for the purpose. The Friendly Societies' Fete at Howe's Farm, which was situated in a pretty valley about 2 miles from the town (near the head of Upper Willis Street), was postponed till the Friday on account of rain. The hotelkeepers set up branch establishments in tents and the vendors of ginger beer and lollipops did a brisk trade. The city bands discoursed sweet music to set folk dancing and many of the young men and maidens indulged in the pleasant pastime of "Kiss in the Ring," while for those who took their pleasures more seriously there was a programme of competitive sports. The Duke, followed by a large cortege, arrived on horseback, his mount a mettlesome black thoroughbred which he managed with ease. Later he rode off in the direction of the Miramar Peninsula to hunt pigs.

Among those whom His Royal Highness entertained on board the Galatea was Tamihana Te Rauparaha, son of the renowned warrior chief of Ngati-Toa. He was met by the Duke himself and shown over the ship, his comment on viewing the Duke's "room" being that it glittered like the rainbow arched in the sky. He presented his Royal host with a kahurangi, a greenstone ornament over 500 years old which he had inherited from his ancestors, it originally having been the property of Hoturoa. This valuable "token of affection" would henceforth be worn on the guard of His Royal Highness's watch. When describing the ceremony Te Rauparaha remarked: "After I had given him this greenstone of so great a name, there was no strength left in my body."

The Duke in Nelson

The Duke sailed for the south on April 17. Once again he spent the Sabbath peacefully aboard ship, landing in Nelson the next day, his reception being "exceedingly cordirl." The Royal carriage, drawn by four shapely greys, waited in the roadway alongside the wharf, and all manner of vehicles were lined up in readiness for the procession. As His Royal Highness reached the Kaianga in Haven's Road the Maoris gave him a tumultuous welcome. Speechmaking was restricted solely to the Superintendent's address and the Duke's reply, the other addresses being merely formally exchanged, a singularly sensible arrangement, as the sun's rays were so strong that everyone was glad to retire indoors. The heat, however, did not lower the attendance at the levee that afternoon and at its conclusion the Duke drove out to see the surrounding countryside. He returned in ample time to open the ball with Lady Monro, wife of the Speaker of the House of Representatives; and the following day he again drove into the country to the autumn race meeting at Stoke. His departure from Nelson was timed for 10 o'clock that night and practically the entire population escorted him to the wharf, where the steamer Lady Barkly was to convey



Part of Lambton Quay about the time of the Duke of Edinburgh's visit. On the extreme right is Bowen Street and in the right background the Bolton Street cemetery.

him to the Galatea. Blue lights burned along the pier and on the various vessels in the roadstead and rockets were fired from the ship Fanny, the Galatea making due acknowledgment by a magnificent burst of fireworks.

Thickets of Bunting in Christchurch

The residents had laid blue cloth on the landing stairs at Lyttleton and set up a triple arch of tree ferns, nikaus, and rare bush treasures. On the side facing the sea were the words: "Welcome, Victoria's Son," worked with leaves on a white ground. His Royal Highness was bombarded with bouquets as he walked to the railway station (the first he had seen in the colony) whence he was to travel by a special train to Christchurch. The city of the plains had exceeded itself in the matter of decorations, the principal thoroughfares being veritable thickets of bunting. There was the usual round of entertainments commencing with a luncheon in the Town Hall at which all the notables of the province were present and concluding with a concert in aid of the Canterbury Yeomanry Cavalry Corps. It is safe to surmise that the funds of the latter benefited considerably owing to the Duke's patronage.

Otago's Caledonian Gathering

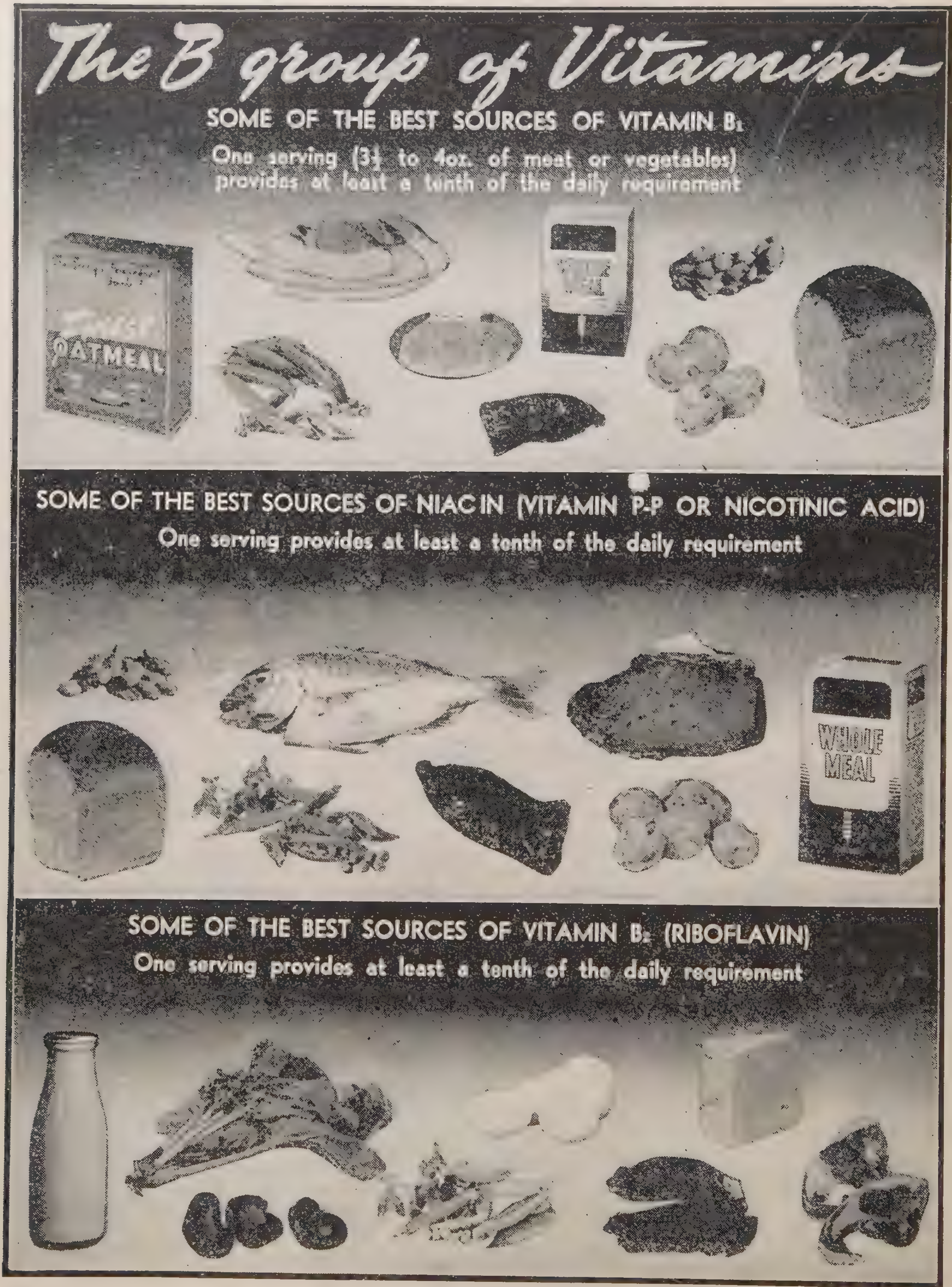
Dray loads of shrubbery poured into Dunedin to be fashioned into all sorts of floral devices prior to the Duke's visit and drizzling rain in no way dampened the enthusiasm with which the citizens welcomed him. True to its Scottish ancestry Otago celebrated the great occasion by holding a Caledonian gathering, the centre part of the pavilion being palatially furnished and reserved for the Royal guest. However, he preferred to watch the games at closer quarters and strolled unconcernedly among the crowd and partook of refreshments in the public tent. A two-day race meeting was arranged in his honour at the Silverstream course, the Duke of Edinburgh stakes being the chief event. His Royal Highness's drag was drawn by four handsome bays and he proved so adept at handling the ribbons as his team sped along the unformed track between Mosgiel and Silverstream that this particular portion of the highway is still known as "The Duke's Road." Another function he attended was the Agricultural Show, at which he presented the prizes in typically gracious fashion, coming away laden with flowers for his quarters on board ship.

Auckland's Hearty Improvisation

Although the Galatea reached Auckland ahead of time, necessitating a start being made with the decoration of the city at midnight. the streets made a brave showing with flags and festoons of greenery and His Royal Highness's reception had "all the heartiness of improvisation." The Superintendent's boat, together with three Maori canoes, preceded the Royal barge to the landing place. The Duke was obviously delighted with the Maori spokesman, Paul Tuhaere, and he received a great ovation from the natives as he stepped into his equipage, which was drawn by six bays and guided by three postilions in scarlet livery with gold facings. The procession which comprised Volunteers, Cavalry, Cabinet Ministers, etc., was a lengthy one and many other important citizens awaited him at Government House where hundreds of schoolchildren were lined up on the lawn in charge of their teachers, despite the fact that the light rain falling as the Duke landed had long since turned to a "downright pour." His Royal Highness was welcomed by Lady Bowen, assisted by her little son George in sailor garb, a compliment the Sailor Prince was swift to appreciate. His holiday at Government House was a most pleasant one. In addition to the usual levee, a native korero was held at which the chiefs presented him with a kaitaka (a bordered mat), two beautiful kiwi feather mats, and a mere parora. He made sundry excursions through the countryside, getting in some good shooting, the settlers, to a man, having kept the season close, and he also spent a few days at Kawau Island.

The ball given by his accomplished hostess, Lady Bowen, on the Queen's birthday was a most brilliant affair, as was the Citizens' Ball in the Fort Britomart Barracks, the piece de resistance at supper being a leviathan cake nearly 6ft. high which bore the portraits of the Prince and Princess of Wales and other members of the Royal Family, the likenesses of the Queen and the Duke of Edinburgh, together with the national emblems, being placed on the top tier. His last appearance in public was when he performed the opening ceremony of the Auckland Grammar School which started with 80 pupils.

On the first day of June, 1869, the Galatea left the lovely landlocked harbour of the Waitemata where she had lain at anchor so long and sailed for the Fijis with her Royal passenger.



The B group of Vitamins

SOME OF THE BEST SOURCES OF VITAMIN B_1

One serving (3½ to 4oz. of meat or vegetables) provides at least a tenth of the daily requirement

SOME OF THE BEST SOURCES OF NIACIN (VITAMIN P-P OR NICOTINIC ACID)

One serving provides at least a tenth of the daily requirement

SOME OF THE BEST SOURCES OF VITAMIN B_2 (RIBOFLAVIN)

One serving provides at least a tenth of the daily requirement

[Sparrow Industrial Pictures Ltd. photos.

The B Group of Vitamins in Food

By EVELYN E. MOORE,
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SOME of the most interesting and significant facts about nutrition have come to light in the study of the B group of vitamins and the diseases which occur when they are lacking from the diet. Most of them, especially the 3 which are important in human nutrition, thiamine, riboflavin, and niacin, have been shown to be essential for one of the fundamental processes of cell life. They take part in the processes by which food is burnt in the body, both for the maintenance of a normal temperature and to provide energy for all forms of muscular activity, just as turbines, transformers, and—of more immediate value to the housewife—electric stoves, sewing machines, and vacuum cleaners are all part of the necessary machinery and equipment for turning water power into electricity and thence into heat and useful work.

[Sparrow Industrial Pictures Ltd. photo.

A dinner of Scotch broth, roast beef, roast potatoes, roast pumpkin, cabbage, fruit jelly, and custard sauce provides sufficient vitamin B_1 for the utilisation by the body of its own calories or energy value, but there is none to spare for utilisation of extra energy foods which do not contain vitamin B_1 eaten during the rest of the day.

FOR many years it was assumed that extracts containing "water-soluble B," later called vitamin B, owed their dietary significance to a single substance—the anti-neuritic factor, or the one which prevents the disease beriberi, which is widespread in Eastern countries and afflicted many inmates of Japanese prison camps during the war. About 1926, however, two scientists showed that this "water-soluble B" consisted of at least two substances, one which was destroyed by heat and one which was heat stable. Since then some 8 other vitamins have been isolated from the extract. Most of them are of only theoretical interest to the normal person eating ordinary foods, for deficiencies of these vitamins occur only in animals fed highly-purified diets, in victims of certain diseases, or in people living on diets so poor that the symptoms of other deficiencies occurring concomitantly will appear first. In other words, a diet containing plenty of all the other nutrients and calories will also contain sufficient of all the less well-known vitamins.

VITAMIN B_1 OR THIAMINE

Knowledge, mostly acquired during the inter-war years, of the part the B group of vitamins plays in the maintenance of health and of their distribution in foods has been of great practical value to Britain and other countries both during the war and in the past 2 or 3 years of world food shortages. About 2/3 of the thiamine and similar amounts of the other B vitamins are lost when all cereal foods are subjected to refining processes, during which all the outer layers of the grain are removed. Particularly when the amounts of cereals eaten are greatly increased, as is the case when meat, eggs, and dairy products are rationed severely, there may be a serious possibility of vitamin B deficiency occurring if only refined cereal foods are used. Therefore the milling of only high-extraction or wholemeal flour is permitted in Britain and New Zealand, not only improving the nutritive value of the diet but also reducing the amount of wheat which must be imported. In the United States of America, where the need to save wheat is not so great, the alternative method is used—fortifying the white flour with the vitamins which have been lost during the refining process.

It is possible, however, that this lack of vitamin B_1 in many of the refined and processed cereals now on the market has been emphasised unduly by advocates of "back-to-nature" diets and advertisers of yeasts and vegetable extracts which contain this vitamin and other foods and tablets rich in it.

Role in Normal Nutrition

The first known function of vitamin B_1 was to cure beriberi, a serious and often fatal disease common in Eastern countries. However, it has other important functions which are likely to be disorganised when an inadequate amount of this vitamin is present in the food eaten, and it seems possible that a lack of it, more than of any other, causes such vague symptoms of ill health as loss of appetite, indigestion, and constipation, as well as such nervous symptoms as irritability and depression, and some forms of neuritis, characteristic of people with finicky food habits and diet fads, as well as of some who take pride in professing indifference to the type of food they eat, the times when they eat, or any other factor inherent in a well-balanced diet. It is also claimed that the neuritis of alcoholism is frequently caused by thiamine deficiency, for the alcoholic rarely consumes an adequate diet.

Experiments have been carried out with volunteers and animals on special diets to test more specifically this effect of a lack of vitamin B_1, and it has been shown that, while all or most nutritional deficiencies tend to result in a gradual decline of appetite, the change from a normal to a B_1-deficient diet, after a short period when the body presumably is using up its reserves, produces a more abrupt loss of appetite than is caused by any other vitamin deficiency. Vitamin B_1 also promotes recovery of appetite in a more prompt and specific way than does any other nutrient.

Such observations gave currency to the unqualified statement, especially advertised by proprietors of B_1-rich health foods, that this vitamin stimulates appetite. However, that is true only when the loss of appetite is caused by a lack of this vitamin, and where it is the result of other diseases, or of other vitamin deficiencies, the stimulating effect of thiamine will be limited by the extent to which the extra thiamine has brought the thiamine content of the diet up to the desirable level. Once sufficient vitamin B_1 is present in the food, extra amounts have no further stimulating effects, and factors such as a diet rich in all the nutrients and the use of attractive ways of serving meals become equally if not more important in stimulating appetite.

Vitamin B_1 is necessary for the maintenance of normal muscle tone in the digestive tract, so that the frequently-reported constipating effect of dietaries too largely composed of artificially-refined food probably is caused at least partly by lack of thiamine.

This vitamin plays a very important part in the utilisation of food to provide heat and energy after the food has been absorbed by the blood and carried to the muscles and places where it is to be used, just as plenty of the digestive juices or enzymes are necessary in the first place for the efficient digestion of the food in the intestine and its separation from the indigestible portion of the food (which is, however, valuable to prevent constipation) so that it can be absorbed by the blood. Quite probably that is the fundamental action of thiamine, an insufficiency causing inefficient use of food and the production of harmful waste products which eventually may produce the outward or visible symptoms of deficiency.

Vitamin B_1 in New Zealand Diet

The rarity in New Zealand of the vitamin-deficiency diseases, such as beriberi and scurvy, indicates that the average diet is far from devoid of vitamins, but it does not warrant the optimistic view that all is well with the diet. In fact, results of surveys of the food habits of New Zealanders indicate that a significant proportion of the population does not obtain sufficient thiamine to maintain the best possible health, as well as lacking some of the other minerals and vitamins. That is the result, at least in part, of two important facts about vitamin B_1.

The first is related to its function in the utilisation of food to produce heat and energy for work. The greater the amount of exercise taken or manual labour carried out, the greater the requirement of both food and vitamin B_1. It may appear self evident that the extra food would also contain the extra vitamin, but unless some forethought is given to the choice of food quite possibly it will not. Cakes, sweets, white scones, or white bread with jam or honey, the majority of steamed puddings, macaroni and tapioca, jellies, and other desserts which are usually particularly popular with the active, growing child are all deficient in thiamine, so that if they form too large a proportion of the food eaten, a mild deficiency may occur, even though a pint of milk and 4 or 5 servings of fruit and vegetables are included in the diet each day.

Second helpings of meat and vegetables are to be preferred to second helpings of puddings, and milk or milk drinks and sandwiches with savoury fillings should be served for morning and afternoon teas as well as cakes and tea or soft drinks.

The second important fact about vitamin B_1 is that no ordinary foods can be regarded as exceptionally-good sources of it, and those which are good sources—vegetable and yeast extracts, wheat germ, and yeast preparations in which the yeast cells have been killed—normally are not eaten in sufficient quantities to increase significantly the vitamin B_1 intake. Though 1oz. of vegetable extract provides practically half the daily requirement of thiamine of a sedentary person, and 1oz. of white bread made with the 80 per cent.-extraction flour at present being used in New Zealand about 1/20 of the requirement, the amount provided by the vegetable extract normally spread on a slice of bread weighing 1oz. (¼ teaspoonful) is only about 1/60 of the requirement.

This also means that, even if only whole-grain cereals, no sugar, and plenty of eggs, milk, and vegetables were included in the diet, the thiamine consumption would not greatly exceed the requirements, so, though everyone views with relief the end of sugar rationing, the housewife who desires to provide her family with a well-balanced diet will still limit the amount of cakes, sweets, and biscuits on the menu.

Sources of Vitamin B_1

With the exception of the highly-purified cereals (cornflour, arrowroot, sago, and tapioca), pure fats, and the various sugars, syrups, and honey, practically all foodstuffs contain some vitamin B_1, but many do not contain it in the amounts required for the best

[*Sparrow Industrial Pictures Ltd. photos.*

Left—A simple breakfast menu of porridge, a boiled egg, white toast, butter, and marmalade, and milk provides adequate vitamins for health. In all meals quantities may be adapted to suit individual requirements. Right—A breakfast of flaked wheat and milk, white toast, butter, and marmalade, and tea contains insufficient of the B group of vitamins. It has ¾ of the energy value, barely ½ the vitamin B_1, and about ⅓ of the vitamin B_2 of the other breakfast. The addition of an extra slice of toast with butter and marmalade makes it of comparable energy value, but the Vitamin B_1 is increased by only 1/6 of the total in the good breakfast and the vitamin B_2 by a negligible amount.

THE B GROUP OF VITAMINS IN THE DIET

[*Sparrow Industrial Pictures Ltd. photos.*

Left—A carried lunch of cheese sandwiches, egg and lettuce sandwiches, milk, and an orange provides a well-balanced meal. Wholemeal bread or some white and some wholemeal may be used. It contains about 1¾ times as much vitamin B_1 as the lunch shown on the right. Right—A lunch of white bread, date and raisin sandwiches, scones and butter and jam, fruit cake, biscuit, an apple, and soft drink contains insufficient of the B group of vitamins.

possible health. Ready-to-eat breakfast cereals, biscuits of various kinds, white rice, and most cakes and puddings (even made with wholemeal flour these are not a very good source of vitamin B_1 because baking powder causes the destruction of some of this vitamin, about ¼ being lost in cake making and 3/5 during biscuit making) are poor sources of thiamine and should be included only in a menu containing some of the better sources of this vitamin. These include pork, bacon, liver (by far the best meat sources of this vitamin), wholemeal bread, oatmeal or wheatmeal porridge, milk, eggs, and some vegetables (particularly peas, broad beans, parsnips, potatoes, kumaras, brussels sprouts, cauliflower, peanuts, and dried legumes). Fair sources of thiamine include the white bread now being made, beef, mutton, prunes and other dried fruits, and most other fresh vegetables and fruits.

Fats, though they do not contain vitamin B_1, do not require this vitamin for their utilisation by the body in the same way as sugars and cereals do. Therefore, especially as fat is usually eaten with other foods in fairly-constant amounts, the average person need not worry about the effect of the fat he eats on his vitamin B_1 requirement.

Three Well-balanced Meals a Day

Important in any discussion of the individual's requirement of vitamin B_1 is the fact that the requirement is proportional to the total food requirement. The second consideration is the paucity of foods which are really good sources of the vitamin. The rather common assumption of New Zealanders that one good meal each day of soup, meat, vegetables, and pudding will compensate for deficiencies in their diet during the rest of the day may be far from correct. For example, a meal consisting of Scotch broth, roast beef and gravy, roast potatoes, roast pumpkin, cabbage, and banana jelly with custard sauce provides sufficient thiamine for the utilisation by the body of its own calories or energy value, but there is none to spare for the utilisation of extra energy foods which do not contain vitamin B_1 eaten during the rest of the day. The supposition that such a meal, while providing perhaps ⅓ of the daily food requirement, provides far more than its due share of minerals and vitamins is not necessarily true, especially of vitamin B_1.

Therefore 3 well-balanced meals are necessary each day to obtain the recommended amounts of vitamin B_1 for the best possible health.

This standard is reached easily if at least one of the better sources of vitamin B_1 is served at each meal. For example, the inclusion of porridge, bacon, liver, kidney, or wholemeal bread in the breakfast menu, and vegetable or meat dishes or some wholemeal sandwiches with savoury fillings such as ham and peanut butter for lunch will help to ensure its attainment.

Causes of Loss in Foods

Like vitamin C, thiamine is destroyed fairly easily by many of the normal cooking processes, though unlike vitamin C it is not destroyed in appreciable amounts during the storage of foods. Though the amount of thiamine lost from food during cookery depends on many factors, such as the nature of the food and the amount of water present, the two which cause by far the most destruction are the presence of soda and cookery at temperatures well above boiling point. The use of soda in the cooking of green and dried vegetables is inadvisable if the food value is to be retained, for soda destroys both vitamins B_1 and C.

Similarly, baking soda breads and scones and biscuits contain less vitamin B_1 than yeast breads and buns, the amount lost being ¼ or more in scones—depending on the quantity and type of baking powder used and the time they are cooked—and about 3/5 in crisp biscuits. Phosphate baking powders often cause greater destruction of vitamin B_1 than other types. The loss during bread baking is seldom more than 1/5 of the total, most of the loss occurring in the crust.

Those figures show the limitation which the use of baking powder places on the vitamin value of baked goods. Though they have a legitimate use in the menu to avoid monotony or to appeal to the appetite, the use of wheat-germ scones, bran biscuits, and other health or vitamin biscuits and cakes which contain baking pow-

THE B GROUP OF VITAMINS . . .

der or require long cooking, instead of bread, especially brown or wholemeal bread, will not improve the diet to nearly the extent usually believed.

The general opinion that toasting improves the digestibility and nutritive quality of bread has also been questioned, for experiments have shown that, especially when toast is baked hard, up to 3/10 of the vitamin B_1 may be destroyed, and its supposed greater digestibility is probably the result of the fact that toast must be chewed more thoroughly than bread.

Little of this vitamin is lost during the cooking of cereals in water or milk—for example, in porridge and milk puddings—but losses from vegetables are rather more, because some thiamine is dissolved in the cooking water. As less water is used when vegetables are cooked in pressure saucepans, and as the cooking time is much shorter, especially for dried vegetables, little vitamin B_1 is lost in this method.

Another common assumption, recently shown to be incorrect, is that fresh baker's yeast, or dried yeast preparations in which the yeast cells are still active or alive, are good sources of vitamin B_1. These supply practically no vitamin B_1, for the cells, being alive, resist the action of the digestive juices and are excreted practically unchanged. Only when the cells have been killed by boiling, or in some other way, does their thiamine become available to the human body.

Unless any of the practices which cause the destruction of vitamin B_1 in greater amounts are habitually in use, the average well-balanced diet will always provide sufficient vitamin B_1.

VITAMIN B_2 OR RIBOFLAVIN

Riboflavin, like thiamine, is essential for practically all forms of life, and consequently is very widely distributed in foodstuffs. Only in the refined foods, such as sugar, pure fats, jellies, cornflour, and custard powders, is riboflavin entirely absent. As most other foods contain small amounts, a serious deficiency seldom occurs except in a diet consisting largely of refined cereals and fats, which is most unlikely in New Zealand.

Presence in Foods

Mild deficiencies of vitamin B_2 probably do occur sometimes, for, like thiamine, it is not present in large amounts in any common foods, and milk, which is one of the best sources, is frequently not consumed in adequate amounts. In fact, without 1 pint of milk (which provides about half the daily requirement of vitamin B_2), 1 or 2 servings of meat, egg, or cheese (which provide 1/10 to 1/5 of the requirement), and 2 or 3 servings of vegetables (which provide about another 1/10), it is exceedingly difficult to obtain the necessary amount of riboflavin from food alone. Fish is a poorer source of riboflavin than meat, fats and sugars contain none at all, and cereals are average to very poor sources, depending on the degree of refinement. Nor are yeast and wheat germ such good sources of vitamin B_2 as they are of vitamin B_1; 1oz. of either supplies little more than 1/6 of the daily requirement.

However, obtaining a sufficiency of this vitamin is not difficult if a pint of milk is included in the menu each day. How it is consumed is unimportant, for vitamin B_2 is not affected by heat or cooking processes. However, the vitamin is destroyed by sunlight, a fact which may be of considerable importance to the city dweller, though it need be of little concern to the average farm housewife. In cities bottled milk may be left standing outside for hours. causing much vitamin B_2 to be lost unless adequate precautions are taken to shade the bottles or brown bottles are used.

Effects on Health

The effects of vitamin B_2 deficiency have been established only recently, for the typical B_2-deficient diet is deficient in several other vitamins as well, and as the symptoms of these deficiencies are predominant, those caused by lack of vitamin B_2 were overlooked until the use of pure vitamins to cure deficiencies became common. Then it was found that certain conditions similar to those caused by vitamin B_1 deficiency failed to clear up until riboflavin was added to the diet. Experiments with animals also indicated that a chronic shortage of this vitamin, while producing no obvious external symptoms, resulted in stunted growth and premature senility.

It also appeared that riboflavin ranked with calcium and vitamin A as major factors in the maintenance of nutritional well-being when fed at levels greater than those necessary to prevent obvious signs of deficiency. These signs include chronically-cracked lips, and especially cracks at the corners of the mouth, inflammation of the mouth and tongue, which may become sore and swollen, an abnormal sensitivity to light, and eye strain. The fact that it may sometimes occur in apparently well-nourished people was demonstrated some time ago when 47 members of a hospital staff, who had come under observation because they had frequently complained of "eye strain" as well as some of the other symptoms of vitamin B_2 deficiency, were all found to have fundamentally bad dietary habits with an inadequate intake of milk, eggs, and green vegetables.

NIACIN OR NICOTINIC ACID

From the point of view of its adequacy in the New Zealand diet, niacin is probably the least important of the B group of vitamins. It is very widely distributed in foods, and only in areas overseas where corn meal, a poor source of niacin, constitutes a very large proportion of the diet does severe niacin deficiency occur, resulting in the deficiency disease pellagra. Moreover, it is one of the most stable vitamins and is not destroyed during the cooking of foods, though like thiamine and riboflavin it is present mainly in the outer layers of grains and is thus also lost during refining processes.

Functions of Niacin

Like riboflavin and thiamine, niacin plays a fundamental part in cell growth and activity and is essential for all forms of life. A lack of this vitamin produces somewhat similar symptoms to those of a lack of the other two. Sore and inflamed patches on parts of the skin exposed to the sun, indigestion, diarrhoea, and mental depression are general features of niacin deficiency.

Distribution in Foods

Though this vitamin is present in almost every foodstuff, some are much better sources of it than others. Lean meat, fish, whole-wheat products, and peanuts are all good sources of niacin; 1 average serving of meat or fish, 2 slices of wholemeal bread, or 1oz. of peanuts provide about ¼ of the daily requirement. Potatoes, peas, broad beans, and dried legumes are all fairly-good sources, providing about 1/10 of the requirement with each serving.

Other vegetables, fruits, dairy products, and refined cereals generally are poor sources of niacin. As the consumption of fat and the protein present in dairy products seems to reduce the niacin requirement, these foods, while containing little of the vitamin itself, are not entirely unimportant in niacin nutrition.

Yeast and meat extracts also contain a relatively-high percentage of niacin, but usually they are eaten in such small quantities that they do not contribute significantly toward the requirement.

THE BALANCED DIET

A balanced diet contains some of each of the 4 main groups of food each day—fats and nuts; cereals, such as oatmeal and brown or wholemeal bread; meat and dairy products; and fresh vegetables and fruits. All except the pure fats are sources of the B vitamins, but they vary considerably in the amounts of each vitamin they contain, so that unless foods are selected from each group the inclusion of the required amounts of each vitamin in the diet may be difficult.

Without bread made from wholemeal or the high-extraction white flour at present in use in New Zealand, thiamine and possibly niacin consumptions are likely to be insufficient; without milk and cheese, riboflavin may be deficient; and without meat, especially liver, kidney, pork, and bacon, which are the best meat sources of thiamine and niacin, either of these vitamins may be lacking. Most vegetables, too, though they cannot be rated as excellent sources, supply more than their fair share of these vitamins. The fats and oils, especially butter and fish oils, also play their parts in maintaining health, for they are a source of vitamin A, which will be discussed next month in the last of this series of articles on vitamins.

PLANNING A HOUSE

PREVIOUS experience of a wide range of housing is a big advantage to anyone who is planning a new home, though a visit or a weekend stay is too short a time in which to learn a house's advantages and disadvantages, its appropriateness or otherwise, for the guest's preferred way of living. Buildings mean much more than plans and pictures alone. Ideas change from childish statements of "When I grow up I'm going to live in a house like Mrs. So-and-so's," but nevertheless later choices will be conditioned by what has been seen. Decisions are made because "I want a fireplace just like the one in the living-room at home," and "I think that arrangement of built-in wardrobes and drawers in the big bedroom at 'Fairways' is ideal." One detail after another is marked for inclusion in a basic plan which is still nebulous.

ONE of the greatest difficulties in planning is finding somewhere to begin. In this article Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, suggests using as a starting point the house at present occupied or the one most familiar. By a process of addition and subtraction, this can be modified until a satisfactory layout is achieved.

List of Features

A list of the following may be made:

Features to be retained, such as a wide, sunny back veranda, bedrooms with morning sun, and a kitchen large enough for a meal table.

Disadvantages which must be eliminated—for example, a detached washhouse at the end of a long garden path, a living-room which is too small and on the cold side of the house so that it receives no sun and makes extra fires necessary, and a long, dark central passage.

Additions which are needed—perhaps more built-in storage space, a shower cubicle, more windows to take advantage of all-day sunshine and give a view of garden and hills, and a room suitable for the accommodation of a farm worker.

This listing will provide a more definite picture of what is wanted, and it will then be possible to see whether the plan of the original house is basically satisfactory and could be altered to fit the new requirements, or whether a new beginning must be made.

Many sources of information are available to the prospective home builder who is looking for new ideas or who wishes to clarify his thoughts. Magazines and magazine articles on the subject are legion, for though not everyone has built a house, most people have lived in one or several, and many of them are willing to write about it. Books on planning the ideal home abound, and the layman is inevitably confused by the mass of material he could collect.

The Architect's Work

Preferably every house should be designed by an architect for an individual family, but that happens in only relatively-few cases, and people are often puzzled about just what the architect does. He has the specialised job of ascertaining the needs and wishes of his clients, of supplementing their ideas with his own, and of seeing them carried out by the building contractor. The architect designs sketc plans which suit the ideas of hi clients, the amount they wish to spenc and the site on which the house is t be built, and which will conform witl current building restrictions and loca by-laws. These plans are then elaborated into working drawings anc specifications which detail the exac materials to be used and the manne in which the work is to be carriec out. The plans and specifications arc a base for the calling of tenders, anc when the contract has been let th architect supervises the building o the house.

Though these services must be paid for, savings in over-all cost are frequently effected by skilful, space-saving planning and the use of materials and construction methods which are well suited to the job and will lessen upkeep and maintenance costs.

In addition to full architectural services, the New Zealand Institute o Architects has recently announced scheme for providing limited service specially suited to the needs of thos who are building small homes.

If finance is being arranged througl the State Advances Corporation, it staff will provide assistance in th selection and criticism of house plans Among its services is the issue of booklets of plans suitable for rura houses; working drawings and specifications are available for these plans.

Details of Planning

Many people with arrangement well advanced have been forced t postpone building because of materia shortages or difficulties in securin builders or contractors. Though extremely annoying to those whose neec for a home may be urgent, such delays need not be regarded as entirel waste time. A longer period in whicl to consider the house plans will frequently result in numbers of smal improvements and save the necessit for snap decisions on many point when building is in progress. Type of handles for doors and kitchen cupboards, the spacing and arrangemen of shelves in storage areas, and th location of lights, switches, and powe plugs can all cause dissatisfaction i exact requirements are not statec clearly. Heights for kitchen bencl tops and washtubs should also be considered carefully, so that the housewif can work at a comfortable height without unnecessary bending or stretching.

The house in the upper illustration has been planned so that additions can be made as they are required. That in the lower picture has grown already, but the addition does not appear to belong to it.

Progress—a new house of the same type but a great improvement on the old one.

Here are a few of the many "traps or young players."

iving-rooms

A draught-creating door located so hat a comfortable group around the replace is impossible.

Insufficient unbroken wall space for arge pieces of furniture such as a iano or couch.

Corner windows only, which do not rovide proper ventilation for a room.

No convenient access from the kithen if the dining space is in the ving-room.

A square room in which the satisactory arranging of furniture is diffiult.

edrooms

Dimensions which cause much waste pace or awkward arrangements for he beds.

Rooms where the only place for the ressing table is in front of the winow.

Long passages or many doors beween bedrooms and bathroom or lavaory.

One small wardrobe in a double bedroom.

Kitchens

Insufficient working surfaces. Bench space is required for baking and dishing up, and it is most unsatisfactory if the meal table or sink bench must be used for these purposes.

No place for a table. If a table is to be included in the kitchen, a free space must be planned so that one of the size and shape required will fit into it.

Top cupboards so high that they are dangerous to climb up to and of little use for storage.

Sinks which are a long distance from the hot water cylinder.

No broom cupboard in the kitchen or elsewhere in the house.

Bathrooms

Not enough cupboards. If possible there should be 2 small cupboards, 1 for toilet articles and 1 for medicines.

Not enough towel rails.

Too small a mirror.

Light not placed over basin and mirror.

No soap dish or hand rail.

Storage Space

No cupboard planned for storing linen and airing clothes.

Cupboards too deep and shelves too wide, so that articles must be stacked behind each other and are difficult to reach.

Cupboards and wardrobes not built right up to the ceiling. The top section should be partitioned off as a separate space for storage of seldom-used articles.

Adapting Overseas Ideas

When considering ideas gleaned from overseas publications, several pitfalls must be avoided.

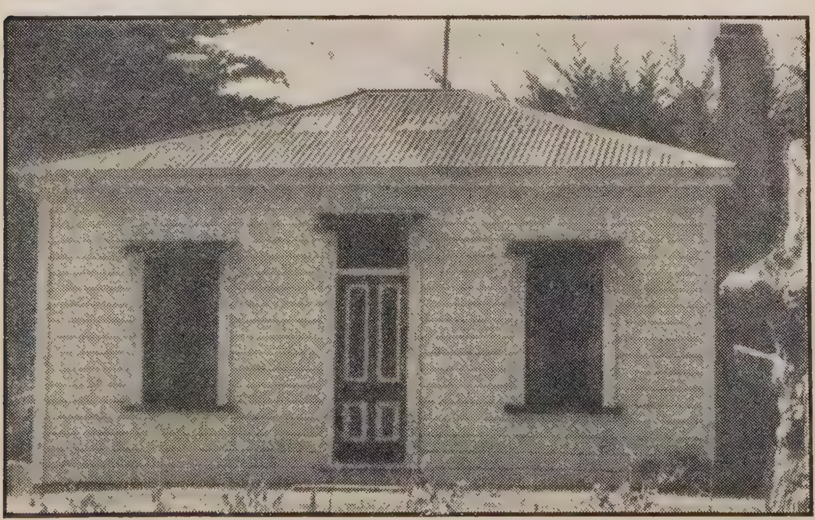
Aspect: In the northern hemisphere the south is the sunny side. If a plan is used in New Zealand without being reversed, rooms planned for sun will face the cold south.

Climate: Severe winters with heavy snowfalls and frozen ground cause provision to be made for basements, central heating, and steeply-pitched roofs, none of which is required in most parts of New Zealand. Precautions against extreme heat and insect pests are also less necessary.

Materials which are cheap and plentiful elsewhere are not always available in New Zealand or are unsuited to the conditions, so it may be impossible to use certain types of interior or exterior finish or methods of construction, though they may look very attractive when illustrated or described.

Though interested travellers may comment on how New Zealanders resemble the English, and observant sociologists remark on the Dominion's important cultural links with the United States of America, the fact remains that New Zealanders live in New Zealand conditions, and acquisitions from overseas should be ideas and techniques which can be adapted to their way of life rather than too-faithful brick-by-brick imitations.

* * *



The square box—easy to build but not so easy to look at or live in.

MEAT COOKERY

BEFORE meat was rationed New Zealand's consumption per head of population was the highest in the world. Rationing taught some economies in the use of meat, and it will be interesting to see what happens to the figures for meat consumption now that meat rationing is over. The ration was adequate for good nutrition, so by refraining from increasing the quantities of meat they use New Zealanders can still help to maintain the level of exports to countries less fortunate. Meat is an expensive food, and a careful housekeeper will plan her buying and preparation so that the greatest possible benefit is obtained from the money spent on it. Poor cooking can spoil the best cuts, and it is with the care and cooking of such meat that Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin, deals in this article. An article in next month's "Journal" will concern methods of cooking the cheaper and less tender meats.

IN country homes it is often necessary to keep sufficient meat for 2 or 3 days' supply, and a watchful eye must be kept on the safe. Especially during hot, dry weather, cracks may develop in a wooden safe through which flies can gain entrance. Meat keeps better if air circulates freely around it, so it is best stored by being hung in large pieces from hooks in the roof of the safe, or by being laid on wire racks such as cake coolers. If meat is put on a solid shelf or on dishes, the juices collect underneath, rapidly develop an unpleasant smell, and taint the meat. The exact length of time for which meat can be kept in a safe cannot be stated, for the weather is the chief factor.

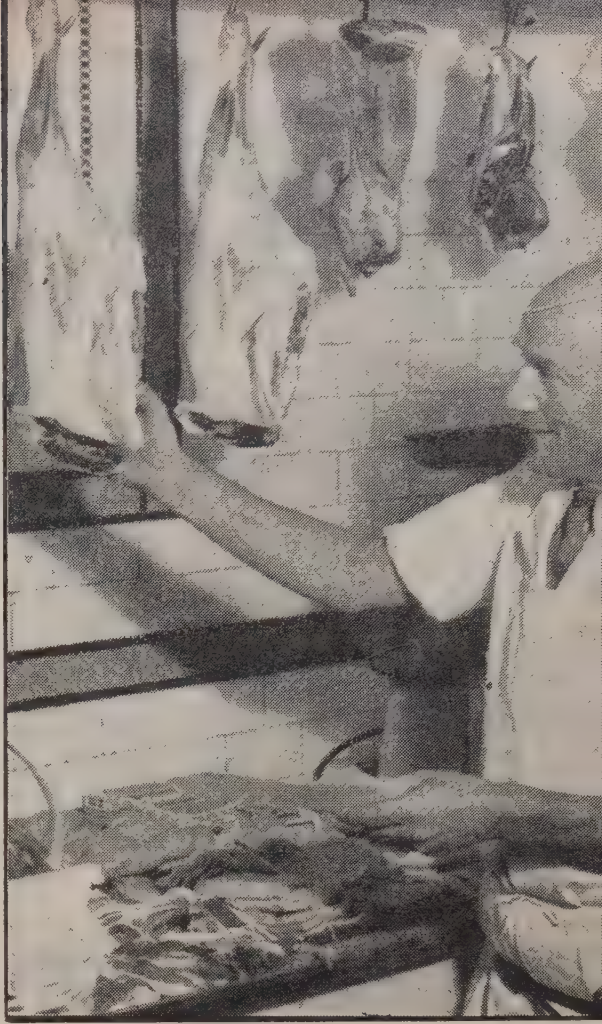
When meat is home killed the neck pieces, chops, and shoulder joints should be used first, as they do not keep as well as the thicker leg joints, which are, in fact, improved by being hung for a while.

The liver of home-killed meat is often discarded, but as liver is one of the best sources of iron and vitamins an effort to use it for the family meals is worth while. Unfortunately it does not keep well and must be used as soon as possible. If the heart, brains, and sweetbreads are required, they also must be used quickly, as the keeping qualities of these organs are very low. Kidneys, if left in their coverings of fat, will keep fresh for a few days if the weather is cool. Chops keep better if they are not cut apart until just before they are to be cooked. Bought meat should be removed from its wrappings before being put away.

A refrigerator provides the ideal place for keeping meat in the household, but meat will not keep indefinitely even in a refrigerator. Raw meat should be placed uncovered in the coolest part of the refrigerator. Cooked meat is better covered for storage in a refrigerator, and should be cooled to room temperature before it is placed in it.

If a refrigerator is not available, only smaller supplies of meat can be kept on hand. Home-killed meat may be out of the question for a small farm family because of the difficulties of keeping it, particularly in warm weather. Some people overcome this by co-operating with neighbours and sharing the meat, or by preserving some of it.

Meat should not be washed, for the water dissolves out some protein, minerals, and flavouring. If meat appears to need cleaning, the surface may be wiped with a damp cloth; a little vinegar may be added to the water used for dampening the cloth.



[*Sparrow Industrial Pictures Ltd. photo.*

Effects of Cooking Meat

Meat cookery is often regarded as simple, but good meat cookery is really an art. The whole aim is to improve the appearance and palatability of the food, but poor cooking methods and faulty timing can ruin meat and make it uninteresting and indigestible.

Heat changes the colour of raw meat, giving it a more appetising appearance. The proteins of the meat are coagulated (just as egg white "sets" when it is cooked), and the connective tissues are softened, making the meat more tender. Flavour is developed by cooking, and particularly by methods which brown the surfaces of the pieces. Cooking reduces the risk of infection by destroying any bacteria or parasites present in the meat, though that does not mean that there should be any relaxation of the precautions taken to have meat treated under the most sanitary conditions, from the time it is killed until its appearance on the dining table.

Cooking for too long with dry heat will make meat dry and cause excessive shrinkage because of the loss of fat and water. Meat cooked by any method at too high a temperature will be toughened. Once protein has been toughened by overheating it is difficult to digest and cannot be made tender again.

Left-over meat to be reheated should be protected from direct heat by a layer of potato, pastry, or batter, and it should not be recooked. All that is required is sufficient heat to cook the covering layer and raise the meat inside to serving temperature. Left-over meat dishes tend to lack flavour, so they should be well seasoned. Planning to cook the correct quantity of meat for a meal is better than having to use left-over meat too frequently.

Cooking Tender Meats

Tender meat may be cooked by dry heat—that is by grilling, pan broiling (dry frying), or roasting. It is desirable to change the colour of the meat and to develop flavour without causing too much shrinkage or loss of juiciness. Thus, though a high temperature may be used at first to brown the surface in all these methods, cooking must be finished at a lower temperature to allow time for the heat to penetrate to the centre of the piece without overcooking the outside.

Grilling or Broiling

Only the most tender cuts are suitable for grilling. The meat is cut thick —from 1 to 2½in.—as thin pieces are most difficult to broil satisfactorily. The meat is exposed on a rack to direct heat over a fire of clear embers or under an electric griller. The griller should be hot before the meat is placed under it. Until both sides of the meat are browned a high temperature is used; then the temperature is reduced, or the meat is placed further from the source of heat until the piece is cooked through. Turning is done with a spatula or knife, not with a fork, for piercing the lean meat with a fork allows juice to escape. The time required for cooking depends on the thickness of the meat and on the temperature, and varies from 10 to 20 minutes for each inch of thickness. The cooked meat should be seasoned and served at once on a hot plate. It may be spread with softened butter, or a small butter ball may be placed on top; the butter may have finely-chopped parsley added to it.

The main points in successful grilling are to cook only the most tender meat, such as loin chops or undercut steak, and to avoid overcooking by reducing the heat once the surfaces are browned.

Less tender meat may be grilled or pan broiled if minced and made into cakes. For example:—

Grilled Meat Cakes (4 servings)

1lb. of minced lean beef
¾ cup of soft breadcrumbs
1 tablespoon of chopped parsley
1 small onion, minced and browned in a small quantity of fat
¼ teaspoon of salt
Shake of pepper

To prepare soft (or fresh) breadcrumbs, use bread which is at least a day old, crumbling it by rubbing it against the medium-sized part of a grater. Mix the ingredients together lightly, form the mixture into 4 cakes and wrap a strip of bacon round the sides of each, fixing it with a skewer or toothpick. Grill or pan broil the meat cakes, turning them once.

Grilled meat cakes may be served on onion rings. Cut 4 slices ½in. thick from large onions, place them in a baking pan, pour over them about 2 tablespoons of melted fat, cover them, and bake them until they are nearly soft. Then place the meat cakes on the onion rings for grilling.

An alternative method of cooking is to place the meat cakes on the raw onion rings and bake them together. In this case the cakes will require basting with stock and fat (½ tablespoon of fat to ½ cup of stock), as the longer cooking tends to dry out the cakes.

Pan Broiling or Dry Frying

Except that the meat is cooked in a pan instead of being exposed to direct heat, pan broiling or dry frying is similar to grilling. Again, only the most tender steak or chops should be used.

Excess fat is trimmed off the meat. The pan is heated and greased very lightly by being rubbed with a piece of suet or a piece of the fat trimmed off the meat. Both sides of the meat are seared, then the heat is reduced and the meat turned as required for even cooking throughout. As for grilling, use a spatula for turning. Do not let fat accumulate in the pan, for then the meat would be fried—that is, cooked in fat—rather than pan broiled, in which method only enough fat to prevent sticking is used. If fat comes out of the meat, as much as possible should be poured out of the pan. When excess fat is trimmed off the meat before it is cooked, fat is not so likely to accumulate except in the case of bacon; if bacon is pan broiled, the fat is poured out of the pan as cooking progresses. Most people cook bacon in its own fat—that is, they fry it, a method of cooking which is familiar to all housewives.

Pan broiling gives a result similar to grilling in some ways, and it is a method of preparation which is preferred to frying by people who do not care for foods cooked in fat. The cooked meat is served in the same way as grilled meat.

[Sparrow Industrial Pictures Ltd. photo.

Raw meat should be placed uncovered in the coolest part of a refrigerator.

Grilled chops and tomatoes. [*Sparrow Industrial Pictures Ltd. photo.*

Roasting

Meat is roasted by being cooked uncovered in a pan in the oven. Tough cuts of meat cannot be roasted satisfactorily.

Place the fat side of the meat uppermost in the pan, as that saves some basting. Extra fat may be added to the pan if the meat is lean, and if desired, mutton and lamb may be floured before being cooked, using flour to which some salt and pepper has been added. It was once thought necessary to sear the meat at a high temperature for a short time, then reduce the heat and continue roasting until the meat was cooked; experiments have shown that this is not essential, and that shrinkage of the meat is less if it is cooked at the same temperature for the whole of the time. Nothing is lost in flavour or appearance by using this method, for by the time the meat is cooked through, the outside is browned.

If shrinkage is not considered important, there is a choice of two methods: Place the roast in a hot oven (450 to 500 degrees F.) and sear it for 20 minutes, then reduce the temperature to 300 degrees for the remainder of the cooking time; or put the meat in a moderate oven (325 to 350 degrees) and maintain the same temperature for the whole of the cooking time. Using either method, the meat may be turned if necessary to brown both sides. For mutton and beef, allow 20 to 25 minutes cooking time per pound of meat for a medium-done roast, and up to 30 minutes per pound for well-done meat. The time may be reduced slightly if the bone is left in the roast. Pork requires longer cooking time—35 minutes per pound. If a roast appears to be drying too much during cooking, use some of the drippings in the pan with which to baste the meat. When serving the roast allow a few minutes for making the gravy to accompany it.

Gravy

Remove the roast to a hot plate and pour the fat from the roasting pan, leaving the brownings and a little fat. Use equal amounts of fat and flour by measure. Sprinkle the flour into the pan, allowing 1½ tablespoons for each cup of gravy required, and brown it in the fat. Then add hot liquid gradually, stirring the gravy to make it smooth. The liquid can be water, but use vegetable stock if it is available, for it adds flavour and makes use of the minerals and vitamins dissolved from the vegetables. Bring the gravy to the boil, and boil it for about a minute. Season the gravy, remembering that if vegetable water has been used, it may contain some salt already.

Stuffing for Roast Meat

The use of stuffing gives a variety, adds flavour to the meat, helps to make it more tender, and acts as an extender. Boned joints may be stuffed, or meat may be cut thick and a pocket made in it for stuffing. Do not quite fill the cavity, allowing for expansion of the stuffing during cooking. Secure the edges of the meat with thread, string, or skewers, removing them after the meat is cooked and before it is served.

Bread Stuffing (to make about 2½ cups)

2 cups of soft breadcrumbs
1 teaspoon of salt
1 teaspoon of mixed herbs
Chopped parsley
Pepper
1 medium-sized onion, minced or sliced finely
3 tablespoons of melted bacon fat or dripping

If the fat is insufficient, a beaten egg may be used to bind the mixture. The onion may be browned in the fat if desired, and small pieces of lightly-cooked bacon may be added for additional flavour.

Potato Stuffing

2 cups of mashed potatoes
1 cup of soft breadcrumbs
½ to ⅓ cup of melted fat
Seasonings
1 egg, slightly beaten

Mix all the ingredients together with the beaten egg.

◆

SETTING JELLIES

Jellies and gelatine desserts are popular summer dishes and the housewife who is in a hurry often puts them in the refrigerator to set. This may hasten setting, but the jelly will soften more quickly when taken out and will be less satisfactory to serve. It is better to put the dish in a cool place (outdoor safe or concrete floor) to set, then chill it just before serving.

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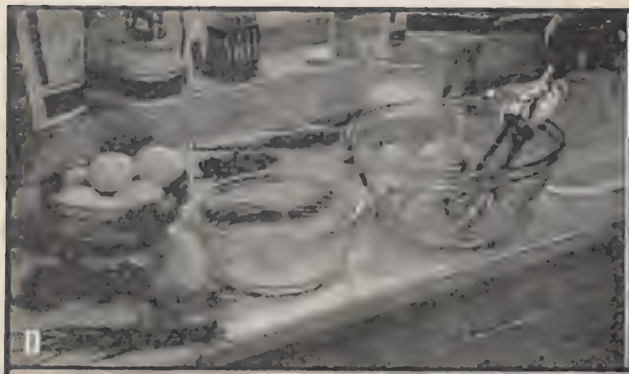
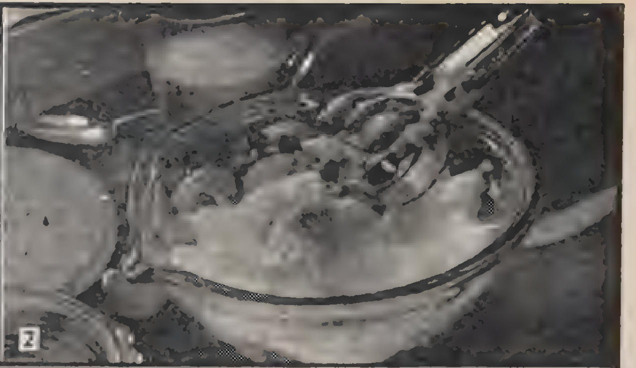
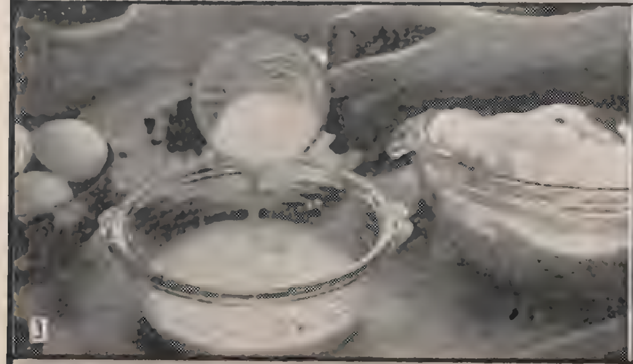
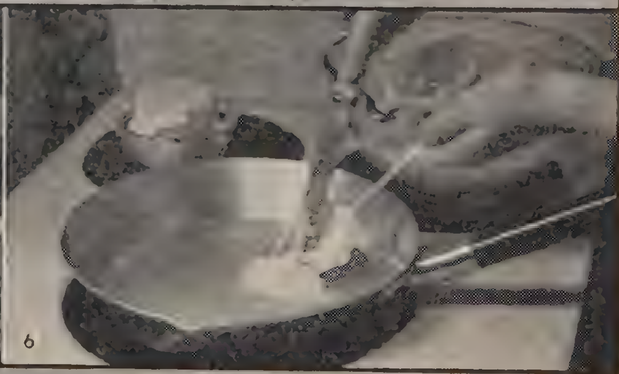




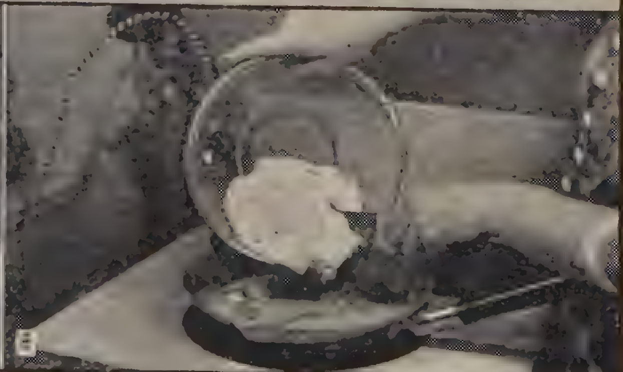
1—Separate 6 eggs, putting the whites into a large bowl. Chop enough herbs (parsley, chives, and thyme) to yield 1 tablespoonful. 2—Beat the whites until they are stiff enough to stand up in peaks.



3—Beat the yolks until they are pale yellow and add 6 tablespoons (½ cup) of milk. Beat them again to mix them thoroughly. 4—Add salt, pepper, and chopped herbs.



5—Add yolk mixture to whipped whites. Cut the whites with a knife or spatula to blend the mixtures lightly; do not beat or stir vigorously. 6—Heat 1 tablespoon of fat in a smooth pan until faint smoke rises.



7—Tilt the pan to grease the bottom and sides thoroughly. 8—Pour the egg mixture into the hot pan, using a knife or spatula to keep it well mixed.

IT is not true that omelets are difficult to make or that only the French can make them successfully. Of course, the fowls must be laying well, but following the instructions and illustrations with this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland, should bring success with the cooking.

A GOOD frying pan is essential—one with a fairly-thick base, shining clean and perfectly smooth. Heavy-grade aluminium pans are good for omelets; another scrap of "information" that can be forgotten is that only iron ones should be used. The size of the pan is important, for one which is too large for the amount of egg mixture will give a thin piece of tough, leather-like substance instead of a thick, puffy, delectable omelet which melts in the mouth.

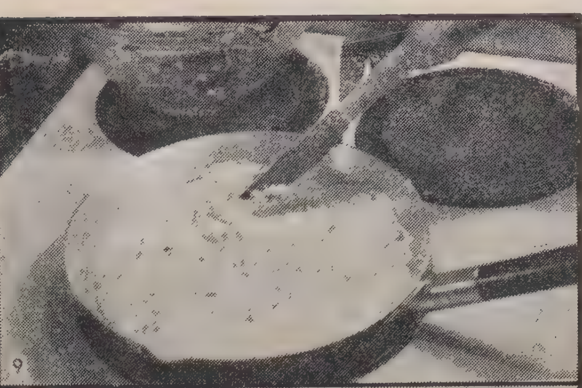
Set the table for the meal beforehand so that there is no delay in serving, as any waiting must be done by those who are to eat and never by the omelet.

Ingredients and Variations

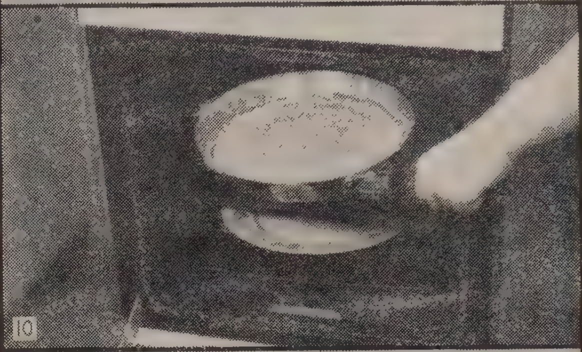
Recipes vary slightly in cookery books, some including flour, some recommending the addition of water instead of milk, and others having neither milk nor water. The ingredients for the omelet the making of which is illustrated are 6 eggs, 6 tablespoons (½ cup) of milk, 1 tablespoon of fat for frying (butter, lard, or mild dripping), salt, and pepper, making sufficient for 3 or 4 servings.

To give variety, fillings can be used—savoury (tomatoes, mushrooms, asparagus, cheese, fish, ham, bacon, and cooked meats) or sweet (jam, or fresh, stewed, or pulped fruit). The directions with the illustrations are for a herb omelet.

Photographs on this and opposite pages by Sparrow Industrial Pictures Ltd.



9—Lift the mixture with a knife while it is cooking to let the liquid part run to the bottom of the pan. Cook the omelet until it is just beginning to set.

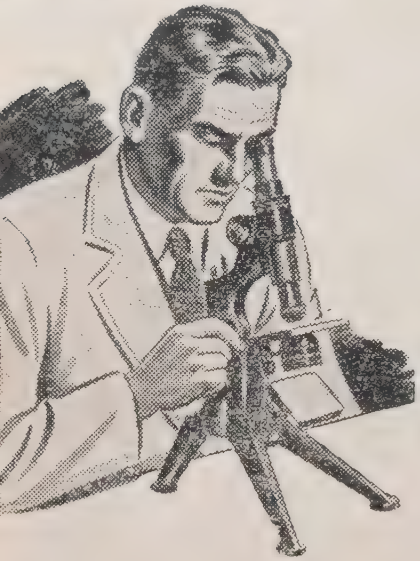


10—Put the pan under a hot grill to set and lightly brown the top.

11—Make a cut crosswise on the omelet.

12—Fold it over, lift it with a broad knife or spatula, slip it on to a heated plate, and serve it at once.

so small—
but oh! so deadly



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Knitted Dress and Coat Set for a Baby Girl

BANDS of lacy stitch and contrasting edges add to the delicacy of a dress and coat set designed for a baby girl aged between six and twelve months. Fine needles and wool and an openwork pattern give the garments a soft, elastic texture porous enough to allow air to reach the skin.

THE materials needed are 5oz. of white three-ply wool and 2oz. of blue, one pair each of No. 10 and No. 12 knitting needles, a medium-sized crochet hook, and 10 small buttons. The tension should be 17 stitches to 2in. in width and 11 rows to 1in. in depth, measured over the main pattern.

The measurements are—Dress: Length from shoulder, 15in.; width all round under the arms, 18in.; sleeve seam, 1½in. Coat: Length from shoulder, 9in.; width all round under the arms, 21in.; sleeve seam, 6½in.

Abbreviations used in the pattern are: K. = knit; p. = purl; sts. = stitches; rep. = repeat; tog. = together; w. fd. = wool forward; inc. = increase; dec. = decrease; g. st. = garter stitch.

The Dress

The back and front of the dress are made alike.

With No. 10 needles and blue wool cast on 121 sts. and work 6 rows in g. st. Change to white wool and work the border pattern as follows: First row.—K. 3, (w. fd., k. 2 tog.) twice, k. 1, * k. 2 (w. fd., k. 2 tog.) twice, k. 2, k. 2 tog., w. fd., k. 1, w. fd., k. 2 tog., k. 3 (w. fd., k. 2 tog.) twice, k. 1; rep. from * to last 8 sts., k. 2, (w. fd., k. 2 tog.) twice, k. 2. Second row.—K. 8, * k. 6, p. 9, k. 6; rep. from * to last 8 sts., k. 8. Third row.—K. 8, * k. 7, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog., k. 7; rep. from * to last 8 sts., k. 8. Fourth row.—As second. Fifth row.—K. 3, (w. fd., k. 2 tog.) twice, k. 1, * k. 2 (w. fd., k. 2 tog.) twice, k. 1, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog., k. 2 (w. fd., k. 2 tog.) twice, k. 1; rep. from * to last 8 sts., k. 2 (w. fd., k. 2 tog.) twice, k. 2. Sixth row.—As second. Seventh row.—K. 8, * k. 9, w. fd., k. 3 tog., w. fd., k. 9; rep. from * to last 8 sts., k. 8. Eighth row.—As second. Ninth row.—K. 3 (w. fd., k. 2 tog.) twice, k. 1, * k. 2 (w. fd., k. 2 tog.) twice, k. 10 (w. fd., k. 2 tog.) twice, k. 1; rep. from * to last 8 sts., k. 2 (w. fd., k. 2 tog.) twice, k. 2.

These 9 rows form the border pattern. Change to blue wool and p. 6 rows. Change back to white wool. Next row.—P. 2 tog., p. to last 2 sts., p. 2 tog. (119 sts.).

Now work in the main pattern as follows: First row.—K. 3, * p. 1, k. 3; rep. from * to end. Second row. P. Rep. these 2 rows twice more. Seventh row.—K. 1, p. 1, * k. 3, p. 1; rep. from * to last st., k. 1. Eighth row.—P. Rep. the last 2 rows twice more. These 12 rows form the main pattern. Continue to repeat them until work measures 10in. from beginning, ending with a right-side row. Change to No. 12 needles. Next row.—P. 1 (p. 2 tog.) 16 times, (p. 1, p. 2 tog.) 8 times, p. 5 (p. 2 tog., p. 1) 8 times, (p. 2 tog.) 16 times, p. 1 (71 sts.).

Change to blue wool and work 4 rows in g. st. Change back to white wool and work the border pattern as follows: First row.—K. 4, then rep. from * in 1st row to last 4 sts., k. 4. Second and alternate rows.—K. 4, then rep. from * in 2nd row to last 4 sts., K. 4. Third row.—K. 4, then rep. from * in 3rd row to last 4 sts., k. 4. Continue working the border pattern in this way, keeping the 1st and last 4 sts. in g. st. until the 9th row has been completed. Change to blue wool and p. 4 rows. Change to No. 10 needles and white wool and p. 1 row, then continue in the main pattern until work measures 11½in. from beginning, ending with a wrong-side row.

Armhole shaping: Cast off 3 sts. at beginning of next 2 rows, then dec. 1 st. at both ends of every row until 57 sts. remain. Continue without shaping until work measures 13in. from beginning, ending with a wrong-side row.

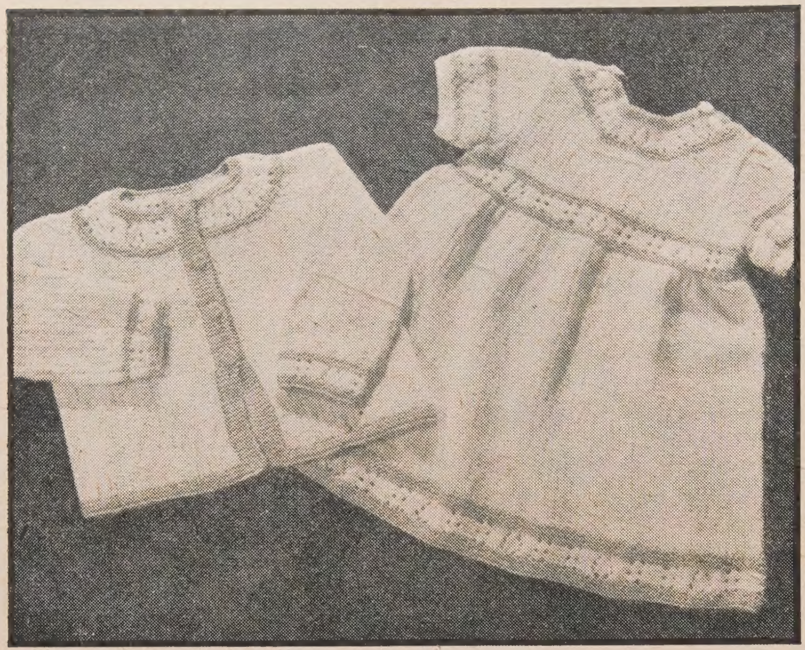
Neck shaping: Next row.—Pattern 21, turn, leaving remaining sts. on a spare needle. Continue on these 21 sts. but dec. 1 st. at neck edge on every row until 6 sts. remain. Continue on these 6 sts. until work measures 15in. from beginning. Cast off. Slip the centre 15 sts. on to a spare needle and work on remaining 21 sts. to match first side.

Neck border: With No. 12 needles and blue wool and with right side of work facing pick up and k. 24 sts. along side of neck, k. the 15 sts. from spare needle, then pick up and k. 24 sts. along other side of neck (63 sts.). K. 3 rows, then change to white wool and work the first two rows of border pattern, but omitting the first and last 8 sts. Third row.—* K. 2 tog., k. 5, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog.; k. 5, k. 2 tog.; rep. from * to end. Fourth row.—* K. 5, p. 9, k. 5; rep. from * to end. Fifth row.—* K. 2 tog., k. 1, w. fd., k. 2 tog., k. 1, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog., k. 2, w. fd. (k. 2 tog.) twice; rep. from * to end. Sixth row.—* K. 4, p. 9, k. 4; rep. from * to end. Seventh row.—* K. 2 tog., k. 5, w. fd., k. 3 tog., w. fd., k. 5, k. 2 tog.; rep. from * to end. Eighth row.—* K. 3, p. 9, k. 3; rep. from * to end. Ninth row.—* K. 2 tog., k. 11, k. 2 tog.; rep. from * to end. Change to blue wool. Tenth row.—P. Eleventh row.—(P. 2 tog., p. 7) twice, P. 3 tog. (p. 7, p. 2 tog.) twice. Twelfth row.—P. Thirteenth row.—P. 2 tog., p. to last 2 sts., p. 2 tog. Cast off purlwise.

Sleeves: With No. 12 needles and white wool cast on 41 sts. and work 6 rows in g. st. Change to blue wool. Next row.—K. twice into first st., * k. 3, k. twice into next st.; rep. from * to end (52 sts.). Change to No. 10 needles and work 3 rows in g. st. Change to white wool and work the 9 rows of the border pattern, but keeping the first 5 sts. before the * and the last 5 sts. in g. st. Change to blue wool and p. 4 rows.

Change to white wool and p. 1 row. Now work in the main pattern, but

COAT AND DRESS SET FOR A BABY



shape the top by dec. 1 st. at both ends of every row until 16 sts. remain. Cast off.

The Coat

With No. 10 needles and blue wool cast on 179 sts. for the full width and work 6 rows in g. st. Now slip the first and last 6 sts. on to spare needles and leave for the front borders. Change to white wool and work in the main pattern until the work measures 5½in. from the beginning, ending with a wrong-side row.

Armhole shaping: Next row.—Pattern 39, cast off 4, pattern until there are 81 sts. on the needle after the cast-off sts., cast off 4, pattern to end. Continue on the last 39 sts., but dec. 1 st. at armhole edge on next 5 rows. Continue without shaping until work measures 7in. from beginning, ending at armhole edge.

Neck shaping: Pattern 20, turn, leaving remaining sts. on a spare needle. Continue on these 20 sts. but dec. 1 st. at neck edge on every row until 11 sts. remain, then dec. 1 st. at same edge on every alternate row until 7 sts. remain. Continue without shaping until the work measures 9in. from beginning. Cast off. Slip the 81 sts. of back on to a spare needle and work on the 39 sts. as given for first front. With wrong side of work facing, join wool to the 81 sts. of back and work in pattern, but dec. 1 st. at both ends of next 5 rows. Continue without shaping until work measures 7½in. from beginning, ending with a wrong-side row.

Next row.—Pattern 15, turn, leaving remaining sts. on a spare needle. Continue on these sts., but dec. 1 st. at neck edge on every row until 11 sts. remain, then dec. 1 st. at same edge on every alternate row until 7 sts. remain. Continue without shaping until work measures 9in. from beginning. Cast off. Slip the centre 41 sts. on to a spare needle, and work on the remaining 15 sts. to match first side.

Neck border: Join the shoulder seams, then with blue wool and No. 10 needles and with right side of work facing k. the 14 sts. from the right front, pick up and k. 14 sts. along the neck edge to the shoulder, pick up and k. 14 sts. along the back neck edge, k. the 41 sts. from the spare needle, pick up and k. 14 sts. along the other side of the back neck, pick up and k. 15 sts. down the neck edge of the front, then k. the 14 sts. from the spare needle (126 sts.). K. 3 rows, then change to white wool and work as follows:—

Work the first 2 rows of dress neck border. Third row.—As third row of dress neck border, but at the beginning and end of the row k. 2 instead of k. 2 tog. Fourth row.—As fourth row of dress neck border, but begin and end row with k. 6 instead of k. 5. Fifth row.—K. 2, (w. fd., k. 2 tog.) twice, k. 1, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog., k. 2 (w. fd., k. 2 tog.) twice, then rep. fifth row of neck border to last 20 sts., k. 2 tog., k. 1, w. fd., k. 2 tog., k. 1, k. 2 tog., w. fd., k. 3, w. fd., k. 2 tog., k. 2 (w. fd., k. 2 tog.) twice, k. 1. Sixth row.—As sixth row of neck border, but begin and end row with k. 6 instead of k. 4. Seventh row.—K. 9, w. fd., k. 3 tog., w. fd., k. 5, k. 2 tog., then rep. seventh row of neck border, ending with k. 9 instead of k. 5, k. 2 tog. Eighth row.—As eighth row of neck border, but begin and end row with k. 6. Ninth row.—K. 2 (w. fd., k. 2 tog.) twice, k. 10, k. 2 tog.; rep. from * of ninth row of neck border ending with k. 11 (w. fd., k. 2 tog.) twice, k. 1.

Change to No. 12 needles and blue wool and p. 1 row. Next row.—P. 4, * p. 2 tog., p. 2; rep. from * to last 2 sts., p. 2. Next row.—P. Next row.—P. Cast off purlwise.

Sleeves: With No. 12 needles and blue wool cast on 42 sts. and work 4 rows in g. st. Change to white wool and work the 9 rows of the border pattern, but begin from * and omit the last 8 sts. in each row. Change to blue wool and p. 4 rows. Change to white wool. Next row.—* P. 2, p. twice into next st.; rep. from * to last 3 sts., p. 3. Change to No. 10 needles and work in the main pattern until the work measures 6½in. from the beginning. Shape the top by dec. 1 st. at both ends of every row until 23 sts. remain. Cast off.

Front borders: With No. 10 needles and blue wool work in g. st. on the 6 sts. of the right front until the strip measures 3½in. from the cast-on edge, then make a buttonhole as follows: Next row.—K. 2, cast off 2, k. 2. Next row.—K. 2, cast on 2, k. 2. Continue making buttonholes 1½in. apart until there are 4 in all. Cast off. Work left-hand border in the same way, but omit buttonholes.

Making Up

Press the work lightly on the wrong side with a warm iron and damp cloth. Join the shoulder seams of the dress for ½in. from armhole edges. Sew in the sleeves, then sew up side and sleeve seams. Work 1 row of double crochet in white across the shoulders, making three loops on the front of the shoulders. Sew on buttons to correspond with the loops.

Sew the front borders to the front edges of the coat, join the sleeve seams, and sew in the sleeves. Sew on buttons to correspond with the buttonholes.

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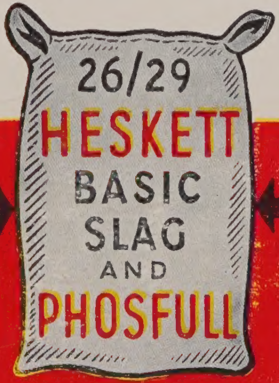
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